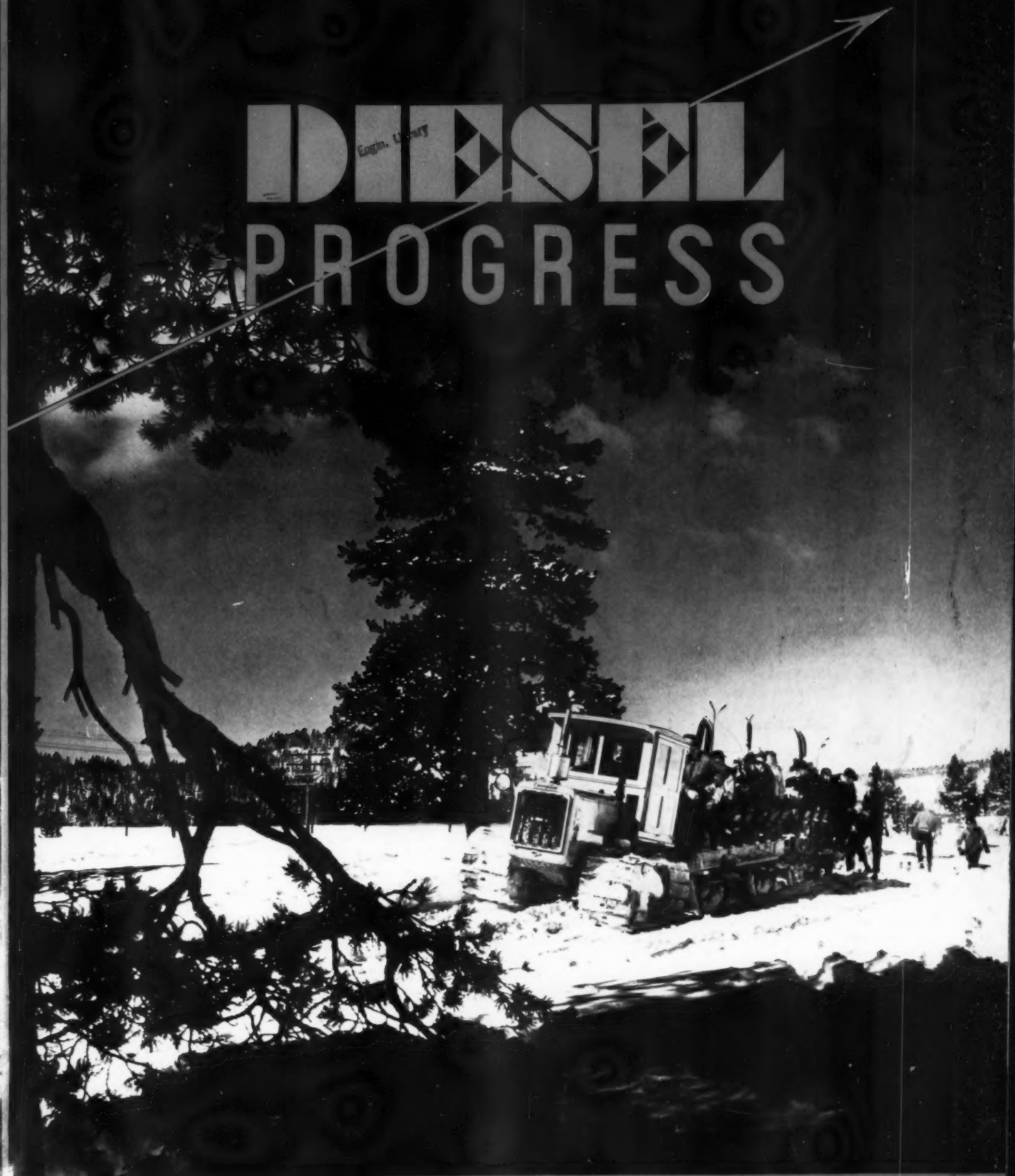
Engin. Library

DIESEL PROGRESS



JANUARY, 1941 CIRCULATION OF THIS ISSUE—IN EXCESS OF 14,000 COPIES 25c

The Year's Diesel Growth Tops 3,240,000 H.P.

PISTON from a McIntosh & Seymour Diesel. After thousands of hours' operation, lubricated with *Texaco Ursa Oil*, the rings are free and active, providing full compression.

EVERY YEAR since 1935, more than a million hp. in Diesel engines has gone into service. In 1937 this increase jumped to more than 2,726,000 hp., while in 1940 the estimated installed horsepower totaled 3,245,000.

One of the reasons for this nation-wide Diesel engine growth is LOWER OPERATING COST. And in achieving this lower cost, *Texaco Algol and Ursa Oils for Diesels* are playing a leading part.

Completely distilled and free from elements that cause sludge and hard carbon, *Texaco Algol and Ursa Oils* keep rings free in their grooves, maintaining piston seal that means full power and fuel economy.

Because of these results:

More stationary Diesel horsepower in the U. S. is lubricated with TEXACO than with any other brand.

The outstanding performance that has made Texaco preferred in this field has also made it preferred in the fields listed in the panel.

These buyers are enjoying many benefits. You, too, will find important advantages when you use Texaco Lubricants and Fuels.

A Texaco Lubrication Engineer will gladly cooperate in making savings in *your* plant. Phone the nearest of more than 2300 Texaco distributing plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York, N. Y.

They Prefer
TEXACO

★ MORE SCHEDULED AIRLINE MILEAGE WITHIN THE U. S. AND TO OTHER COUNTRIES IS FLOWN WITH TEXACO THAN WITH ANY OTHER BRAND.

★ MORE BUSES, MORE BUS LINES AND MORE BUS-MILES ARE LUBRICATED WITH TEXACO THAN WITH ANY OTHER BRAND.

★ MORE STATIONARY DIESEL HORSEPOWER IN THE U. S. IS LUBRICATED WITH TEXACO THAN WITH ANY OTHER BRAND.

★ MORE DIESEL HORSEPOWER ON STREAMLINED TRAINS IN THE U. S. IS LUBRICATED WITH TEXACO THAN WITH ALL OTHER BRANDS COMBINED.

★ MORE RAILROAD ROLLING EQUIPMENT IN THE U. S. IS LUBRICATED WITH TEXACO THAN WITH ANY OTHER BRAND.

★ MORE TOURISTS USE TEXACO FIRE-CHIEF GASOLINE THAN ANY OTHER BRAND.

TEXACO DEALERS INVITE YOU TO ENJOY

FRED ALLEN in a full-hour program every Wednesday night. CBS, 9:00 E. S. T., 8:00 C. S. T., 10:00 M.S.T., 9:00 P.S.T.

METROPOLITAN OPERA every Saturday afternoon. NBC. See local newspaper for time and station.

TEXACO Lubricants and Fuels
FOR ALL DIESEL ENGINES

DIESEL and GAS ENGINE PROGRESS

CCA

Member National Business Papers Association and Controlled Circulation Audit, Inc.

NBP

REX W. WADMAN
Editor and Publisher

FRONT COVER ILLUSTRATION: Unique use of Caterpillar Diesel tractor to haul guests from the resort hotel "Sugar Bowl" to the top of the nearest ski jump about a mile from the hotel. The "Sugar Bowl" is located approximately 100 miles northwest of Sacramento, Calif., in the High Sierras. The tractor also hauls freight, food, laundry, and supplies from the station to the hotel.

TABLE OF CONTENTS ILLUSTRATION: "Bettebrooke III," new 46 ft. Wheeler express cruiser built for Holbrook Ellis, Watch Hill, R. I. A pair of six cylinder, four cycle, 165 hp. Gray Diesels supply the power.

DIESEL PROGRESS for January, 1941. Vol. VII, No. 1. Published monthly by Diesel Engines, Inc., 2 West 45th St., New York, N. Y. Tel. MUrray Hill 2-5092. Subscription rates: U. S. A. and Possessions $3.00 per year; 25c per copy. All other countries, $5.00 per year; 50c per copy.

PAUL H. WILKINSON
Aviation Editor
HEYWORTH CAMPBELL
Art Director

CONTENTS

JANUARY

	PAGE
DIESEL RAIL TRANSPORTATION	24
DIESEL YACHT *FROM NOW ON*	26
MOBILE DIESEL GENERATING PLANTS	28
THREE DIESEL TOWBOATS	30
DIESEL TUNA CLIPPER *CHALLENGER*	34
DIESELS FOR VILLAGES	37
DIESEL TUG *JENNIE WILSON*	40
BRYAN, OHIO	42
SEABOARD RAILWAY DIESELIZES	45
BAIRD, TEXAS	46
BANKERS LIFE BUILDING	49
SOUTH AMERICA BUYS DIESELS	50
CHARLES BALOUGH—CHARACTER SKETCH	53

Burlington Route
Photo by Hedrich-Blessing Studio.

Interior of the club lounge.

A ten-unit articulated streamline Diesel-electric train.

PROGRESS IN DIESEL RAIL TRANSPORTATION

By W. J. EICHMAN

THE following is a series of excerpts from a paper presented by W. J. Eichman of the Burlington lines, Chicago, Illinois, before the American Institute of Electrical Engineers, Rock River Valley Subsection, October 8, 1940, at Rockford, Illinois:

On some occasion most everyone has had the opportunity of witnessing a modern streamliner in action. If it happened to be a Zephyr, you first would notice a speck of stainless steel emerging out of the distant haze, then in spectacular fashion it would flash by a mass of shimmering steel, a hundred miles an hour, and then within a course of seconds, vanish again into the distance.

These sights are so commonplace today that little thought is given to the short space of time that has elapsed in the evolution of this class of rail transportation. The type of Diesel engines used in powering many of the high-speed streamline trains over the rails of the Nation today had their origin in the General Motors exhibit at the Century of Progress in Chicago in 1933-1934. There were a pair of them there furnishing current for the exhibit. During this period the Burlington management conceived the idea of adopting this engine for rail motive power, which resulted in the development and birth of the original "Pioneer Zephyr", completed early in 1934, and after an extensive tour of the country was placed in regular service Nov. 11, 1934, between Lincoln and Kansas City. This was the first streamliner powered with a Diesel engine to be placed in operation in this country, a short span of only six years.

Since then, other railroads have become interested in this type of equipment so that up to the present time there are in excess of 130 Diesel-Electric streamliners in service in this country. The Burlington Lines now operate 15 such trains with the 16th under construction, representing a total of 35,240 hp. and developing 11,018 miles daily, with an average of 734.5 miles per locomotive. * * *

From the inception of Diesel service up to and including August 31, 1940, the Zephyr type high speed trains have produced a total of 10,188,903 miles which is outstanding due to the fact that the majority of this mileage has been developed since 1937. In order to stress the remarkable performance of this equipment, let us refer to Zephyr 9901 which was placed in service in April, 1935, as one of the first Twin Cities Zephyrs between Chicago and Minneapolis, in which service it made 415,782 miles. It then was transferred to the Texas Lines and from Sept. 30, 1936, to Sept. 1, 1940, it made 793,648 miles or a total of 1,209,430 miles.

In the four years it has been assigned to the Texas Lines, the mileage shown indicates that

out of 810,082 assigned miles, this train actually run 793,648 miles or 97.97 percent availability. However, in March of this year it was involved in a serious grade crossing accident resulting in it being taken out of service for fifteen days causing a loss of 8,531 service miles. Discounting this mileage, the train would have made 802,179 miles with an availability of 99.02 percent. To put it another way, this train only lost 28 days of service out of the four years; 15 days was charged against the crossing accident, 11 days for annual inspection, and only 2 days charged against failure of the locomotive proper. Surely, such a remarkable performance could not be duplicated by any other type of single unit.

One of the prime functions in keeping these streamliners in service is a highly co-ordinated maintenance personnel which has been specially trained for such exacting requirements. Regular inspections and running repairs are made at the maintenance points during lay-over period which varies from 6 to 12 hrs., according to the length of the assigned run. One of the first duties of the engine maintenance personnel is to remove the air duct covers for inspection of the pistons and rings which can be seen through the air scavenging ports in the cylinder liners. When it is found that a ring is tight in the groove or a piston shows signs of blackening due to blow-by, it is removed for cleaning and application of new rings, if necessary. Since it is necessary to take off the cylinder head for removal of piston, the head is thoroughly inspected and the exhaust valves and guides cleaned. All of the valve and injector rocker arm assemblies, automatic slack adjusters, valve springs, etc., are carefully inspected each day for defects. Our experience indicates that, by a thoroughly trained maintenance personnel and systematic inspections, the power units can be kept in good running condition for approximately 1,200,000 miles.

The two cycle Diesels used in powering the Burlington streamliners were the first of its kind in which the developed power from cylinder head to crankshaft were tied together through a weld. The case is of solidly welded construction, utilizing flame cut shapes in which full dependence is placed upon the welded joint. One of the outstanding developments in the fabricated structure is that rigidity has not been sacrificed. This point is of great importance because rigidity determines the life of the main bearings and the wear of all moving parts contained within the structure. However, maintaining rigidity and reducing weight are directly contradictory. To accomplish reduction in weight and still maintain rigidity, the sections must be carefully distributed in the most advantageous manner.

Some time ago we became interested in what the mileage limitations would be of the major parts of the Zephyr type Diesel engine. After considerable field research indications are that: the rigid fabricated steel crankcase will render satisfactory service for at least 10,000,000 miles after which metal fatigue may be the limiting factor; the crankshaft will not need to be reground before 1,200,000 miles, after which it may be expected to go through another cycle of approximately the same mileage; with the Allison metal main crankshaft bearings now being used, the life should be extended to 800,000 miles and the connecting rod bearings at least 500,000 miles; it is estimated that the life of cylinder liners will be about 1,000,000 miles after which they should be reground and fitted with oversize pistons and rings; the type of pistons now used can be expected to produce at least 800,000 miles before they are worn to the limit. The average life of the two top piston rings is 100,000 miles and for the remainder of the rings 200,000 miles; the useful life of a cylinder head varies from 800,000 to 1,000,000 miles before they require extensive reconditioning. The average life of a valve is about 450,000 miles. With the exception of an occasional cleaning, renewal of the check valve compression spring, needle valve and spray tip, the life of a fuel injector is well over 2,000,000 miles.

The recently acquired Diesel high-speed road locomotives are rated at 4,000 hp. each, and

. . . . . *And now please turn to page 56*

Another unit in the Burlington fleet of Diesel-electric streamliners.

"FROM NOW ON"

By GEORGE D. CROSSLEY

DECIDEDLY similar to *Episode,* which was featured in DIESEL PROGRESS for December, 1939, *From Now On,* a sister ship in hull design and construction, comes also from the design of Nelson and Almen, naval architects of New York and was built at Annapolis Yacht Yard, Annapolis, Maryland. The newer Diesel yacht differs in having more powerful engines, in interior arrangement, and in the design of her superstructure. Generally pleasing in appearance, she has an open flying bridge due to her owner's belief that its advantages offset the operator's occasional discomfort.

Being one of the outstanding additions to the yacht register in 1940, *From Now On* has an overall length of 70′ 3″, an extreme beam of 15′ 3″, and a draft of 4′ 9″. She displaces 72,000 pounds equipped for cruising.

She is powered with a pair of Superior 8 cylinder 8½″ bore by 10½″ stroke Diesels, which develop 230 hp. each. These engines are fitted with the jerk-pump fuel injection system with individual pumps for each cylinder and differentially loaded, multiple orifice spray nozzles. Automotive type connecting rods are employed and the connecting rod bearings are of precision babbitt lined bronze.

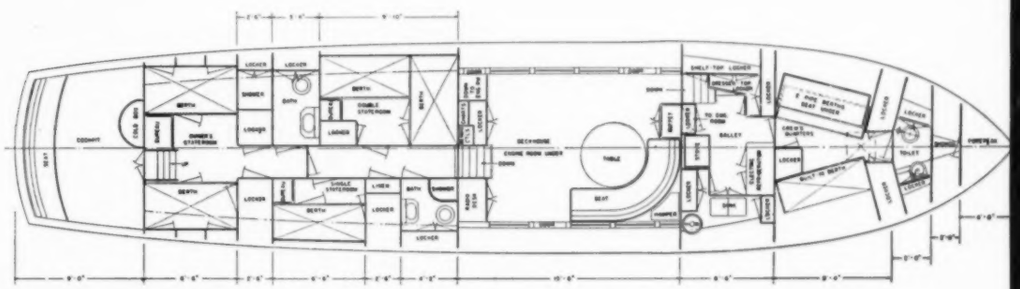
The main bearings are bronze-backed, babbitt lined, and the marine type crankpin boxes are fitted with removable, bronze backed, babbitt lined shells. A system of covers encloses the entire engine and all of the valve gear and its parts. These covers are secured to flanges which are an integral part of the engine frame casting. The effect of this is to give a smooth exterior with plenty of room inside for the valve gear.

Top left: "... under way. ... ly pleasing ... Center: En... showing th... perior Die... engines. ... view of the ... house.

The top covers are hinged, and the side covers are of individual cylinder size so that they are easily and quickly removable. This provides for easy access to any part of the crankcase or to any or all cylinders. The lubricating system is of the dry sump type and it supplies lubrication under pressure to all bearings as well as the rocker arms and valve gear.

Located in a compartment which is insulated for sound and heat and located amidships, the engines are direct connected to the propeller shafts. The jacket cooling systems are connected to a fresh water system which is common to both engines. Bendix vacuum controls are fitted to each engine with the maneuvering controls located on the flying bridge. With this power plant, she makes a speed of a little over fifteen knots.

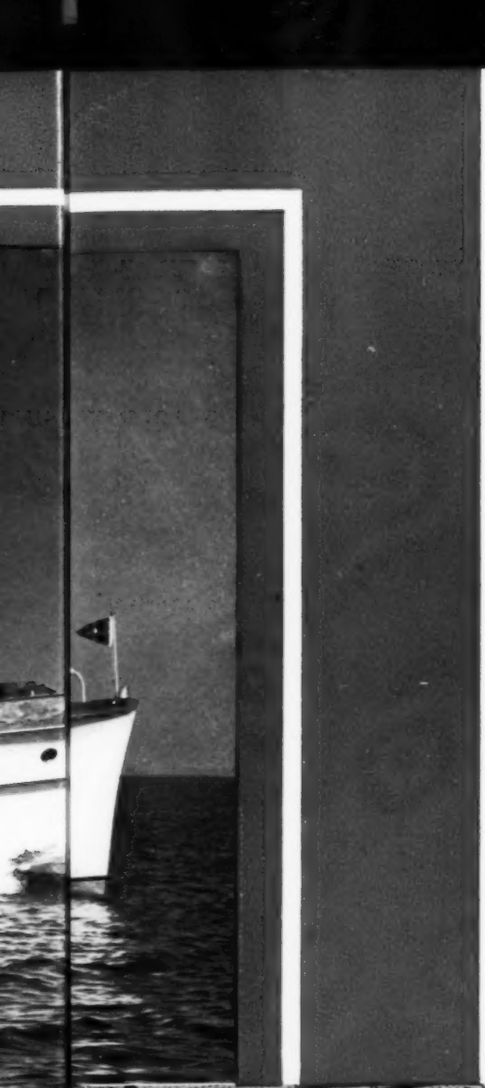
Also located in the machinery compartment are the Diesel-electric generating set which supplies 110 volt current for lights, refrigerator, windlass motor, and various other services, the water heater and a CO_2 fire fighting system. Fuel tanks, having a total capacity of 700 gallons, are fitted along either side of the engine room and the emergency fuel tank and fresh water storage are installed in the lazarette. There is ample room to move about in the machinery space.

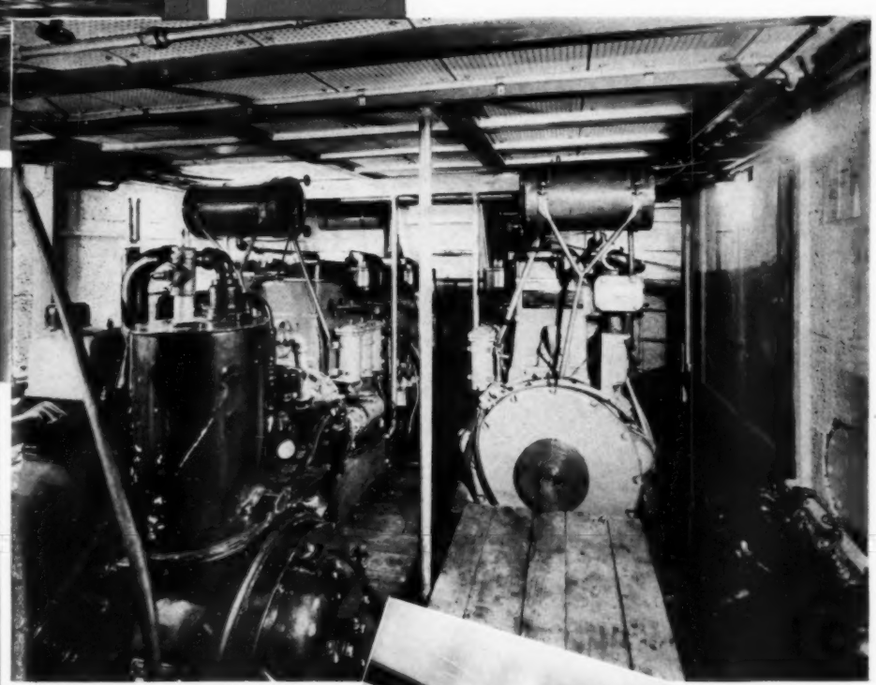


Deck plan showing the interesting arrangement of rooms

Materials of construction are of the best selected grades throughout this modern yacht. Keel and framing are of white oak. Double planking, the inner layer of white cedar and the outer layer of mahogany, is fastened with Everdur bronze. The upper layer of the double planked deck is of teak, which is noted for its resistance to the ravages of all kinds of weather. All exterior trim is done in Honduras mahogany, including the cabin trunk, the deckhouse and the flying bridge. The interior of the deckhouse is finished in walnut, while all joinerwork below decks, including the bulkheads and the owner's quarters, is of Weldwood. The ship is divided into five watertight compartments by four steel bulkheads. A 13 foot motor launch is carried.

Luxurious appointments distinguish the accommodations throughout. The spacious deckhouse is fitted with a curved lounge and table. Two double staterooms and a single stateroom make up the owner's quarters. The galley equipment includes a Shipmate gas range and an electric refrigerator. An electric water cooler is installed in the buffet and a beverage cooler is provided in the cockpit aft. The crew's quarters, forward, are large and comfortable. *From Now On* was built for Gordon Fisher, Jr., of Baltimore and she is a distinct credit to the good taste of her owner as well as the ability of her designers.





Top left: "From Now On" under way. She is especially pleasing in appearance. Center: Engine room view showing the pair of Superior Diesel propulsion engines. Right: Interior view of the luxurious deckhouse.

MOBILE GENERATING UNITS

By DOUGLAS SHEARING

INCREASING interest in mobile Diesel-electric generating plants—complete central station power-houses on wheels—on the part of industries, public utilities, and governmental agencies is evidenced by both the rapid extension of the use of such units and the appearance on the market within the last year of several new pieces of mobile power equipment. The growing need is for a portable power supply system that can be readily transported and that can be made available for immediate power generation wherever the demand arises.

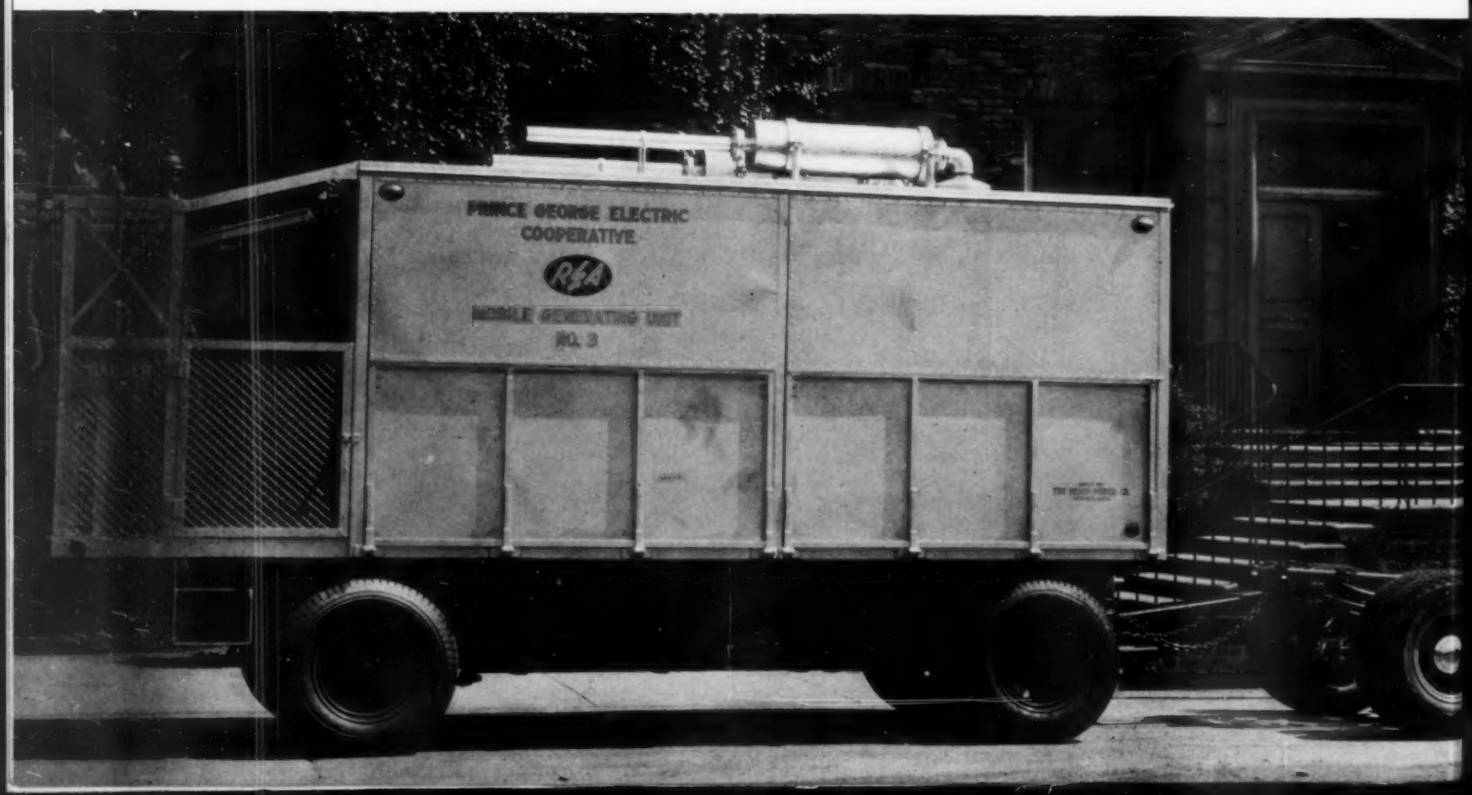
The plants illustrated herewith are those developed by the Ready-Power Company. They are rated at 100 kw. for 60 cycle service. Each mobile unit carries two 50 kw. Ready-Power International Diesel Engined Electric Plants, a complete switchboard, fuel oil storage tank, electric fuel transfer pump, lubricating oil rectifier, starting batteries, station transformer, and both AC and DC station lighting system. A substation with transformer, lightning arrestors, and air break switches is installed on the rear platform of the trailer unit.

These plants were built for the Rural Electrification Administration for portable generating and power distribution stations. For emergency use the high tension substation equipment is omitted. These Mobile Generating Plants can be operated alone or in parallel with other mobile plants or as "boosters" in parallel with central station power. They are complete—carry their own fuel—have a power operated fuel supply pump for fuel transfer from tank wagon or other supply source. They are completely muffled and sound-deadened, to permit operation in congested districts without creating a noise nuisance.

These complete generating plants are truly mobile. The trailer design permits their transportation at high speeds behind any tractor truck equipped for the operation of trailers having vacuum brakes. This mobility together with the self-contained complete power plant makes possible not only rapid movement but also instantaneous delivery of current. The International Harvester Diesel engines as used in these mobile plants are started on gasoline with simple automotive type 12 volt Delco-Remy starting motors. After a brief warming up period the engine is "thrown over" to full Diesel operation. As a result starting is quick and positive and in case of battery failure it is practical to crank the engines by hand which is important where the unit is used for emergency service.

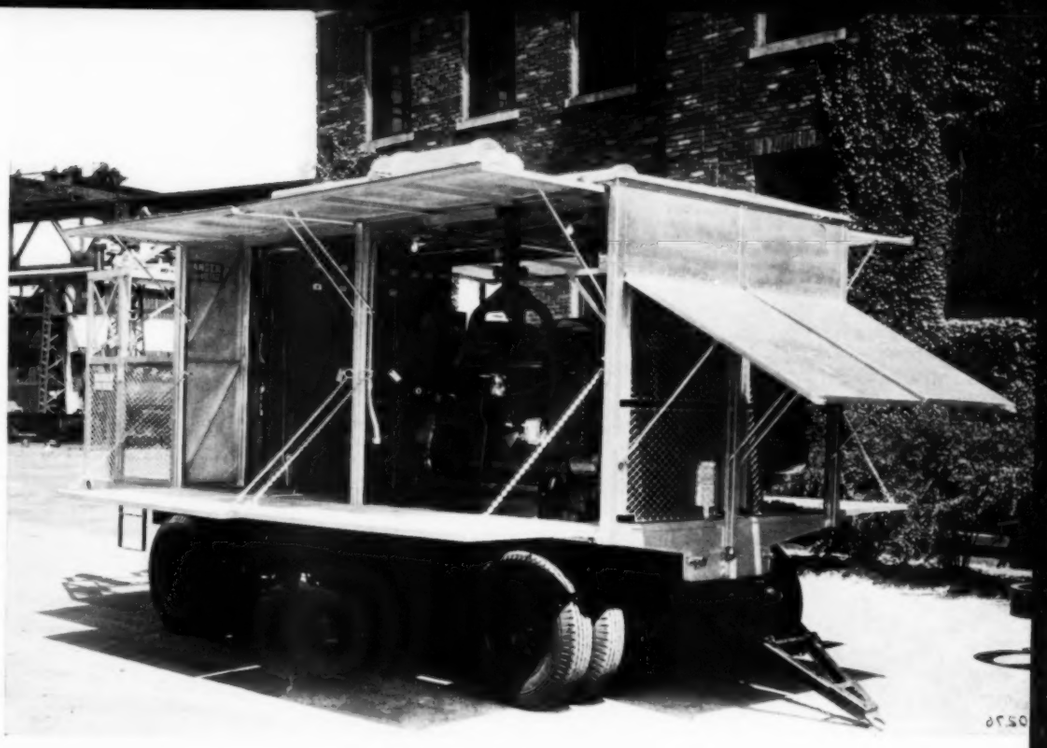
It is interesting to note that these units are more than Diesel-generating sets mounted on trailers. The design is worked out to give trouble-free and economical service in out-of-the-way places. The cooling system is arranged to blow air outward through the radiator so that the power compartment is kept comfortable for the operator. In bad weather, the trailer can be operated with the sides completely closed—the doors in front of the radiator only being opened. In this case cooling air is admitted through a ventilating grille in the floor of the trailer directly aft of the generator, drawn over the generator and engine by the cooling fan, then blown out through the hinged doors.

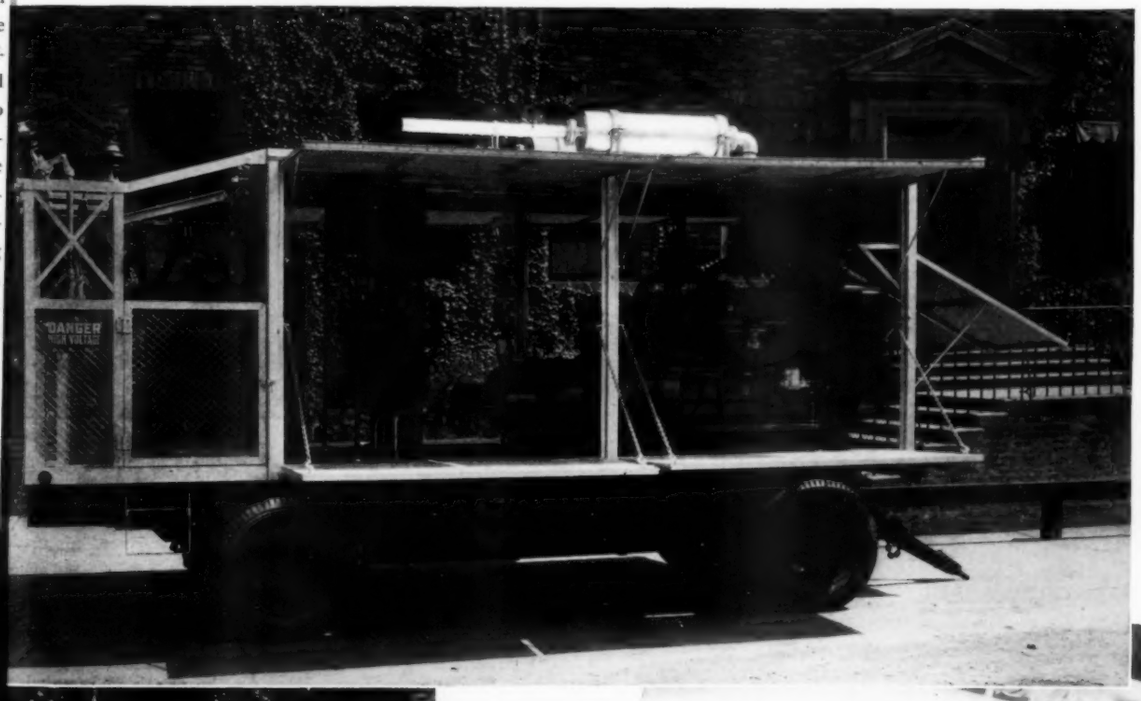
A Mobile Diesel-electric power plant built for the Prince George Electric Co-operative at Disputanta, Virginia, for energizing rural electrification lines at 13,200 volts.



Other designs and sizes of mobile power generating plants, ranging in capacity up to 400 kw. rating per trailer for 60 cycle service or plants for direct current with similar rating or alternating current plants for 25 or 50 cycle operation with proportionate ratings, have been made available to meet these various service requirements.

By and large, the broad field for mobile generating units presupposes the conditions which are best satisfied by Diesel engines. Economy is, of course, paramount, but second only in importance, are dependability and simplicity in operation. Diesels meet these conditions admirably, being the most efficient prime movers yet devised and in their present state of development, almost self-sufficient in operation over long periods with little or no attention.





Two views of the same unit, a mobile generating plant now in service at the Community Electric Co-operative at Suffolk, Virginia, operating in parallel with the unit shown on the opposite page. Note, these units are complete power plants including filters, exhaust mufflers, engine cooling, switchgear and sub-station. The plants are protected by the Ready-Power switchgear which automatically stops the engine in the event of unusual cooling water temperature, lube oil pressure or voltage. This apparatus at the same time disconnects the generator from the buses and transformers.

A mobile unit in service at Jordan Valley Electric Co-operative, Jordan Valley, Oregon.

A NEW TREND IN RIVER TOWBOAT DESIGN

By WILL H. FULLERTON

SIGNIFICANT in Dravo Corporation's production of floating equipment last year was the construction of three sistership river towboats of a small, compact type and new hull design. These twin-screw Diesel propelled and Kort Nozzle equipped vessels are the *Ductillite,* built for Wheeling Steel Corporation; the *Semet-Solvay,* for the Semet Solvay Company; and the *Victory,* which will be added to the fleet of Dravo's Keystone Sand Division. Soon to join the rapidly growing armada which plies the Ohio River waterways, they will introduce a new, functional styling with a high freeboard design for open water service. And they have the opportunity to establish further claims to distinction in the matters of payload performance and economical operation.

It was anticipated that the Kort Nozzles, in conjunction with the tank-tested hull lines, would increase the effective push developed by these boats by 18 to 25 per cent at normal towing speeds, above that which would otherwise be developed from the rated horsepower of the engines. Actually, the trials on the *Ductillite* more than fulfilled this expectation. The flanking tests were likewise gratifying, and the maneuvering and handling qualities under the control of the vessel's two steering and four backing rudders were noted to be unusually good. The ship's free running speed, with engines operating normally, is 12 mph.

The *Ductillite* will serve its owner in the transportation of coal from mines in the Allegheny Valley to the Wheeling and Steubenville plants. It will probably assume the role formerly accorded the flagship of the Wheeling fleet, *La Belle,* a stern wheel steamer built in 1921. A comparison of the effective power of the two vessels, based on the trial tests, gives a striking demonstration of the progress in towboat development during recent years.

The steamer *La Belle* has an indicated horsepower of 700; it has a high pressure cylinder 14¼" in diameter, low pressure 28½", and a stroke of seven feet. It has an overall length of 174 feet (26 feet required for the wheel), beam of 28′ 4", and a depth of 5′ 6". The *Ductillite* is rated at 760 hp., has an overall length of 135 feet, beam of 27 feet, and depth of 11 ft. 9 in. Under bollard test conditions, the *Ductillite* surpassed the *La Belle* by 45 per cent in forward push; 125 per cent in backing power; 400 per cent in forward steering power; and 50 per cent in flanking power.

The fact that a screw propelled boat is able to surpass a stern-wheeler in flanking and backing performance speaks eloquently for the advanced propulsion and steering methods used. The new hull design gives these three towboats a seagoing appearance. The effect was achieved by raising the "main deck" level about three feet above the fender line. The high freeboard thus obtained makes the vessels more suitable for open water service than the conventional flush deck towboat. This development anticipates the changed conditions on inland waterway transportation which are being created by the larger pools resulting from navigation and flood control projects.

Advantage is taken of the raised deck by locating the crew's quarters as well as the mess and galley in the hold, the full width of the hull being utilized for this purpose. In keeping with the design, the hull has port holes instead of windows, and these are recessed for protection. A steel house on the raised deck forward

contains the officers' quarters, above which is the upper structure containing, in the case of two of the vessels, the Texas deckhouse and the pilot house. The *Semet-Solvay* has no Texas, its need for quarters being less extensive because shorter runs are planned.

Each of the ships is of compact but efficient arrangement and use of space results in liberal provisions for human as well as mechanical needs. Locating quarters in the hold was an innovation for river vessels and steps were taken to provide adequate insulation and ventilating facilities. Since completion of the *Ductillite,* the crew's quarters have proven to be unusually comfortable, attributable in part to the space available and to the protection afforded by the upper deckhouses as well as to the insulation and ventilating provisions. All three vessels have unit heaters with blowers, the units being located in the mess room, engine room, lounges, forward and aft holds, and the pilot house. Additional heat is supplied by radiators, steam being provided by a 15 pound oil fired water tube boiler. The blowers of the unit heaters are used for ventilation, if required, during the summer months. Supplementing this ventilating system, there is a liberal complement of cowl ventilators, forced exhaust from galley, etc.

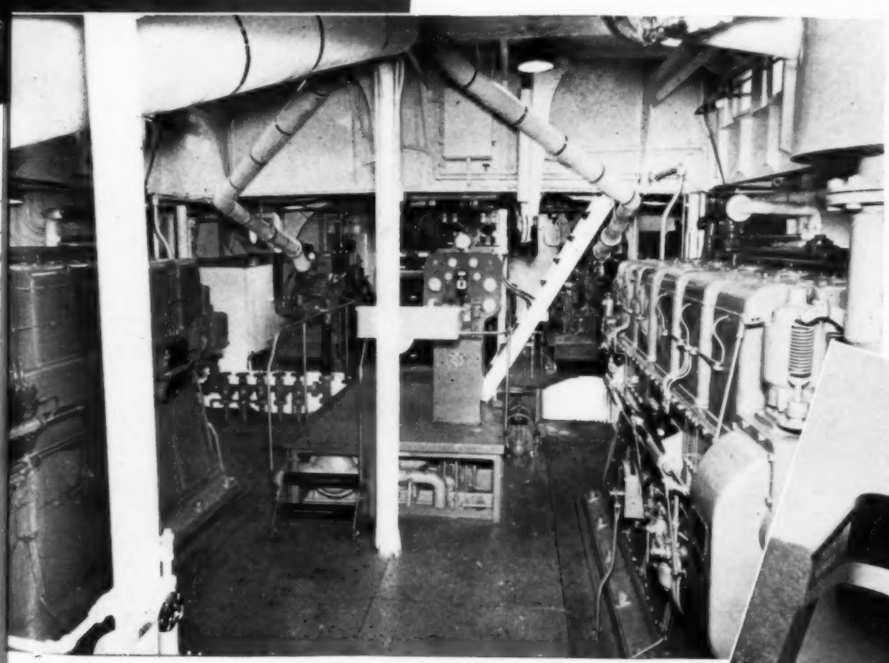
The pilot house controls and instruments are all built into a single unit stand, a recent development by Dravo. The controls are conveniently positioned and there is an adjustable foot rest for the pilot.

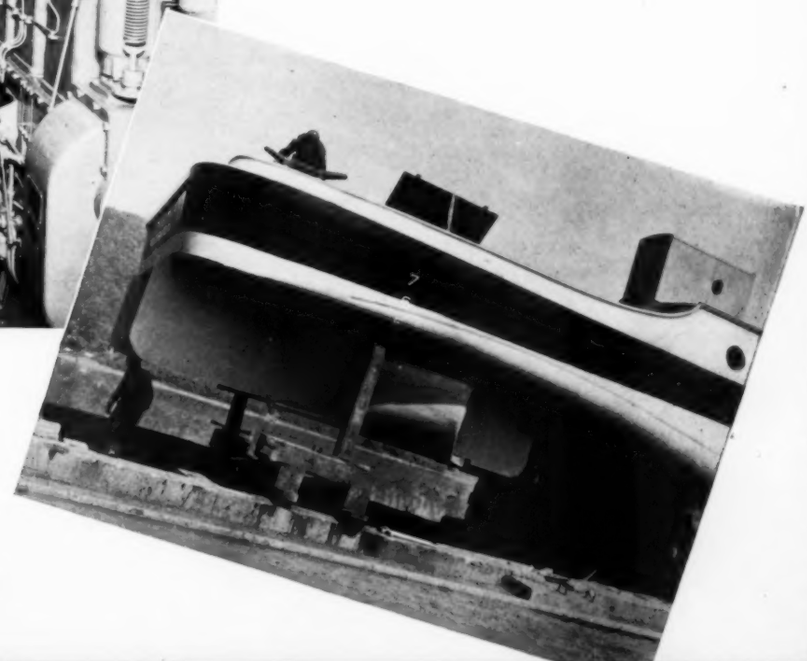
It has been noted that the new hull design with the raised main deck contributes to greater seaworthiness, additional comfort to ship's personnel, and economy in size and structure. It has the additional advantage of providing greater structural strength to the ship and reducing vibration. Moreover, the added depth of the trusses strengthens the stern.

The superstructure and hull of each vessel are of all-welded steel construction. The hull is built on the transverse frame principle, being divided into compartments by five main watertight transverse bulkheads carried to the raised deck. The sections for these were preassembled in an inverted position, an established Dravo practice to permit a maximum of down-hand welding. The hull has a continuous stringer at the normal deck line, and the raised deck is tumbled home 9 inches. A girder keelson is fitted on the center line for the full length of the ship. Longitudinal bulkheads on each side of the vessel are made oiltight to form fuel oil bunker tanks in the wings; these tanks extend under the floor of the forward engine room. The shell is formed of 15 pound plating on bilge and side, 14 pound on bottom, except that the bow has 17 and 20 pound plating, and furnaced plates are 1/16 inch thicker.

The vessels are powered by Cooper-Bessemer JS-6 full Diesel engines, which are capable of developing a total of 760 hp. at 310 rpm., 75 pounds b.m.e.p. Each engine is of the six cylinder, four cycle type, with 13″ bore by 16″ stroke, and drives a 5½ foot propeller. The propellers are partially encircled by the tunneled design of the stern and fully enclosed by modified Kort Nozzles. The steering gears are of Dravo manufacture with De Laval positive displacement pumps.

All auxiliary units are powered by Superior Diesels. The *Ductillite* has two 35 kw. sets, the *Semet-Solvay* two 25 kw. sets, and the *Victory* has one 35 kw. set. The exhaust systems of all main and auxiliary Diesels are fitted with Maxim silencers.



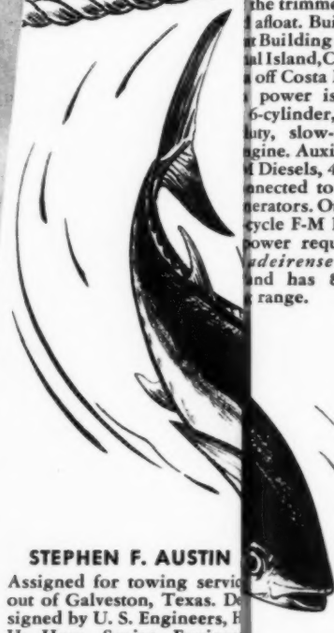


Top view: The "Semet-Solvay" on trial run. Center: The "Victory," "Semet-Solvay," and "Ductillite," three 760 hp. Diesel sisterships undergoing completion at the Dravo outfitting dock at Neville Island. Above: Engine room view typical of all three vessels. Right: The Kort nozzle and rudders. Six rudders are used, two aft and four forward of the wheels.

In SAUCY TUG o U

the inside story for good work is -

GOOD DIESE



ADEIRE

the trimm
afloat. Bu
Building
al Island, C
off Costa
power is
6-cylinder,
ity, slow-
gine. Auxi
Diesels, 4
nected to
erators. O
cycle F-M
power requ
adeirense
nd has
range.

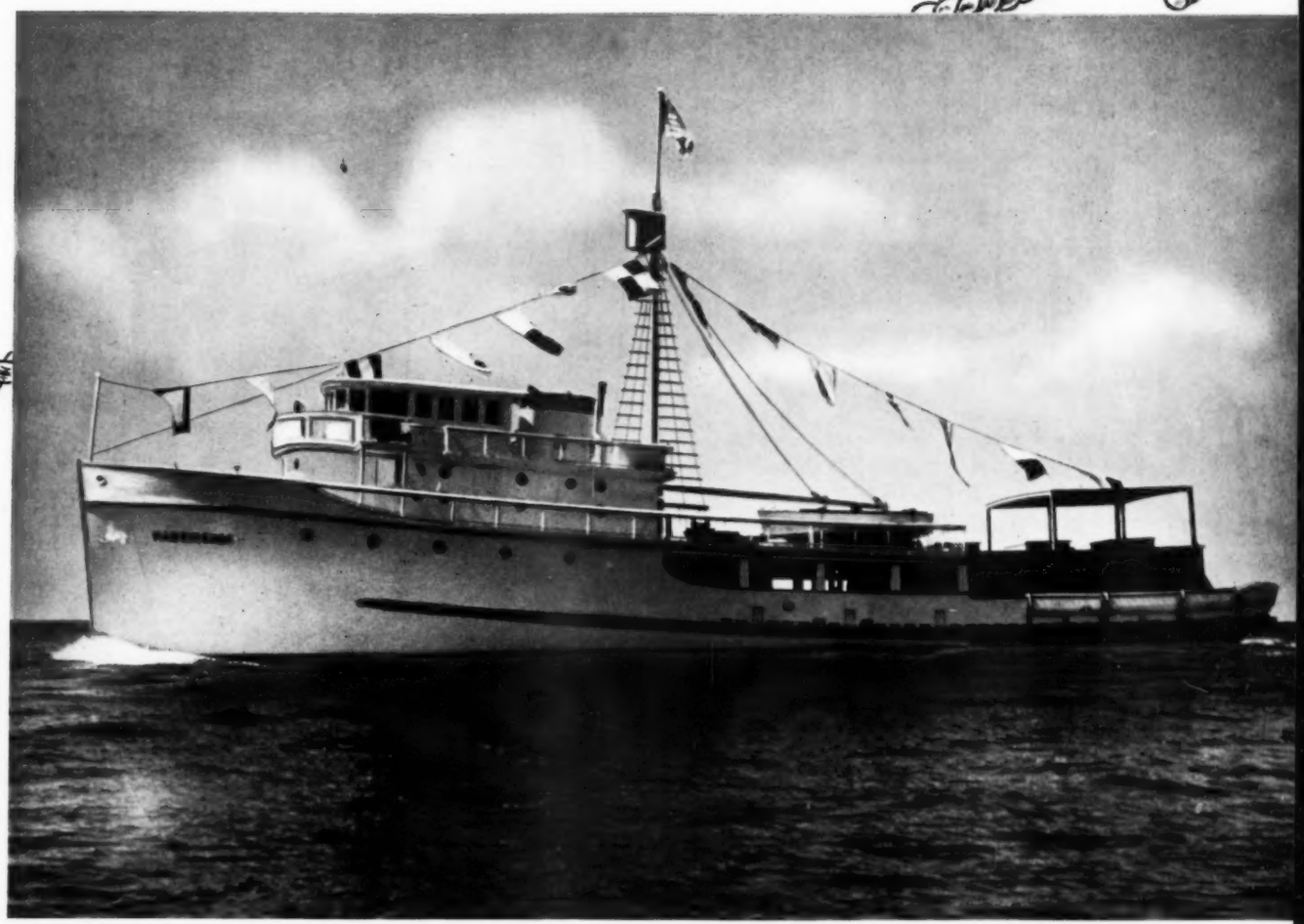
STEPHEN F. AUSTIN

Assigned for towing servic
out of Galveston, Texas. D
signed by U. S. Engineers, H
H. Haas, Senior Enginee
Built by Spedden Shipbuil
ing Co., Inc., Baltimore, Mar
land. The main power plant
a Fairbanks-Morse 2-cycl
Diesel with mechanical injec
tor. Engine rates 450 h.p.
260 r.p.m. On this moder
towboat the fresh-water sy
tem is a Fairbanks-Morse

FAIRBANKS MORSE

DIESEL ENGINES ELECTRICAL MACHINERY RAILROAD EQUIPMENT WASHERS-IRONERS STOKERS
PUMPS FAIRBANKS SCALES WATER SYSTEMS FARM EQUIPMENT AIR CONDITIONERS

UNA CLIPPER



ADEIRENSE
the trimmest craft of
afloat. Built by Har-
t Building Company,
al Island, Calif. Fishes
off Costa Rica. Pro-
power is by F-M
6-cylinder, 600-h.p.,
uty, slow-speed, 2-
gine. Auxiliaries are
Diesels, 4 cycle, di-
nected to F-M cur-
erators. Other auxil-
cycle F-M Diesel for
ower requirements.
adeirense rates 12
nd has 8000-mile
range.

Deep sea or coastal waters, wherever real work has to be done economically, you'll find Fairbanks-Morse Marine Diesels. They are built for the purpose to which they are put—from free-running craft to towing service. For example, when U. S. Engineers wanted an engine for heavy-duty, back-breaking towing, their exact choice was a Fairbanks-Morse Diesel rating 260 r.p.m. The trim tuna clipper (shown above) needed speed and ability to carry full catches at wide throttle. The exact choice here was a Fairbanks-Morse Diesel rating 400 r.p.m.

Both are *straight drive,* thus eliminating expensive transmission losses. Both are slow speed, meaning less wear on moving parts. Both are two-cycle engines with fewer moving parts and easier to service. Both have quiet brute power, absence of vibration, faithful dependability, and low maintenance and fuel cost. They are built for specific marine uses from bedplate up.

So if you are going to build or convert, come to Diesel Headquarters first—where there is no need to compromise on an engine—where there is the most extensive Diesel experience in the world. Write Fairbanks, Morse & Company, Dept. 23, 600 South Michigan Avenue, Chicago, Ill. Branches with service stations in principal ports.

7892-OA27.552

Diesels

F M

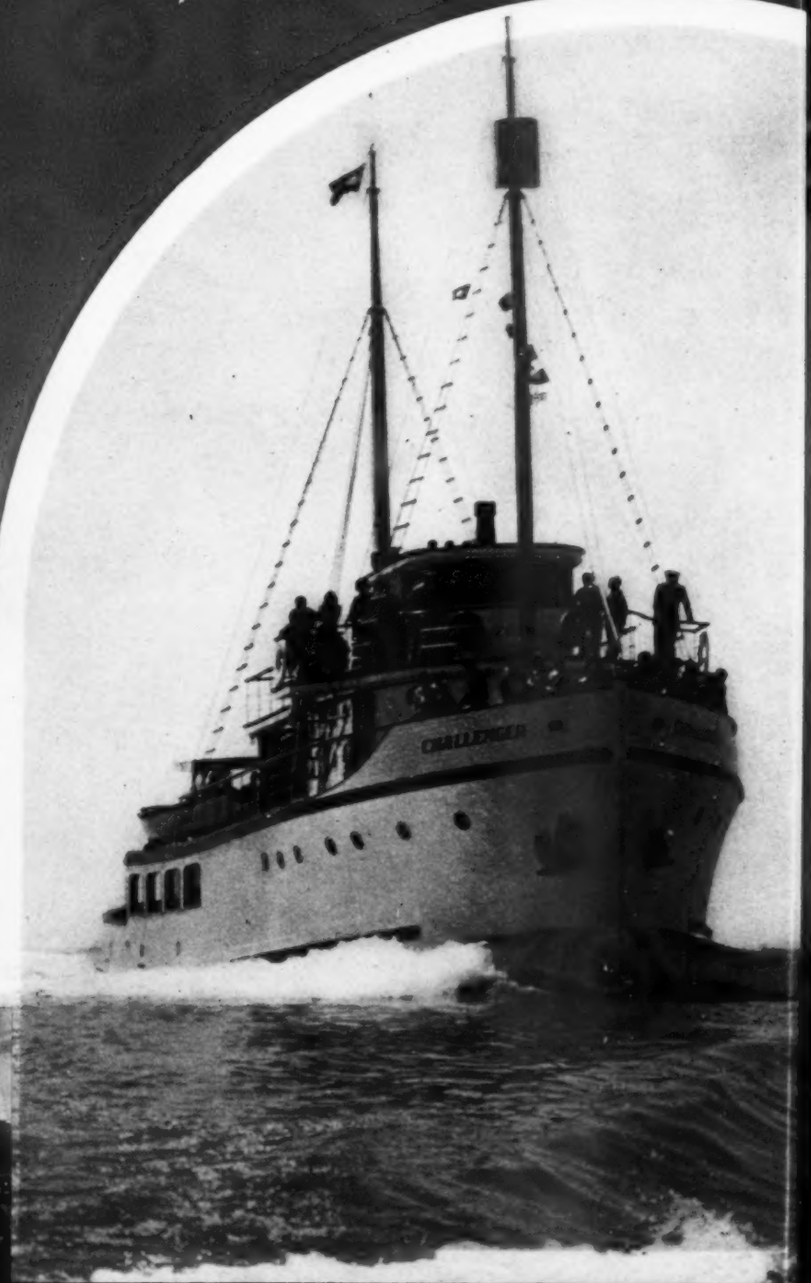
Challenger

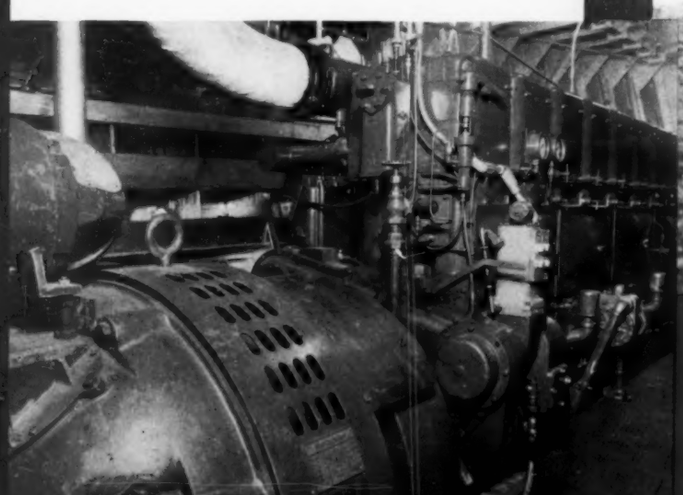
Variable Speed AC Diesel-Electric Tuna Clipper

By JIM MEDFORD

DIESEL-ELECTRIC drive, which for years has been an interesting subject of discussion and study among tuna boat operators and builders, is a reality with the completion of the 128 ft. tuna clipper, *Challenger,* by the San Diego Marine Construction Company, San Diego, Captain Oakley J. Hall, president, at a cost of $225,000. The vessel, designed jointly by Dean B. Johnson, plant superintendent in charge of hull construction, and James N. Johnson, marine engineer and manager in charge of machinery design and installation, is of the raised deck, cruiser stern type, with a beam of 27 ft. 1 in.; depth, 13 ft. 3 in.; three decks with quarters for crew of sixteen; chapel, radio room, and galley on secondary deck, and pilot house with skipper's stateroom on top deck. The clipper is in charge of her owner, Captain Joe Rogers.

Hull construction is of the composite type with planking of 3½ in. Bataan mahogany electric-arc stud-welded to 4 in. by 3 in. by ⅜ in. steel frames on 19 in. centers. Butts of frames are electric welded to a 5/16 in. keel plate bolted to the 14 in. by 16 in. 108 ft. fir keel. Deck is of the same material and dimensions as the planking and there is no ceiling below the main deck. This is the first time that hardwood of these dimensions has been used in tuna boat construction and tends to add tremendous strength to the vessel. The hull is further strengthened by installation of two longitudinal bulkheads of 5/16 in. steel traversing the shaft alley from the after engine room bulkhead to the after fuel tank. Tied on to these are two 12 in. steel I-beams, one on each side, which extend to the forepeak. The use of steel framing increases the cargo space by 35%, at the same time giving the necessary rigidity ordinarily supplied by massive keelsons and engine timbers. The double bottom, or deep tank, has a capacity of 16,000 gallons of engine fuel. Additional tanks of 5,000 gallon cap. each are installed, one in the forepeak and one in the stern, giving a total bunkering





One of the 175 kw. Westinghouse generators direct-connected to the 275 hp. Atlas Imperial Diesel engine as installed in the Diesel-Electric Tuna Clipper "Challenger." There is a duplicate of this power unit on the port side and a 200 hp. Atlas generating set amidship.

Engine room of the "Challenger" showing the two 275 hp. Atlas Imperial [illegible] at left and extreme right, and the [illegible] hp. Atlas in the right foreground.

capacity of 26,000 gallons, sufficient for 7,000 miles cruising range.

Propelling and auxiliary machinery present a wide departure from standard tuna boat practice and include exclusive and outstanding features worked out personally by "Jimmie" Johnson in solving the problem of alternating current application to propulsion.

The Diesel power plant consists of two 275 hp., 8 cylinder Atlas Imperial engines, turning up a maximum of 514 rpm., direct connected to 175 kw., 440 volt, 3 phase, 60 cycle, a.c. Westinghouse generators and one 200 hp., 6 cylinder Atlas, turning a 125 kw. generator of same make and rating. American Hammered piston rings are used in these Diesels. Other accessories are Woodward governor, Purolator oil filter, Ross heat exchanger and lube oil cooler, and an Alnor pyro point pyrometer.

The three-unit "cascade-assembly" a.c. propulsion system, covered by patent application, is as follows:

On the propeller shaft assembly are three variable-speed motors. The first is a 60 hp. at 495 rpm., the second, 250 hp. at 870 rpm., and the third, 500 hp. at 1160 rpm. These motors are coupled to the same shaft and rotate together, but the power is applied to only one motor at a time. The power is applied first through the 60 hp. motor, that unit being brought up to speed of 495 rpm. This starting operation (when a.c. power is used) requires an inrush of power slightly above twice the horsepower of the motor. As the second motor, 250 hp., is already turning 495 rpm., the inrush of power necessary to bring to speed of 870 rpm. is not over 250 hp. The same procedure is followed with the 500 hp. motor. Therefore it requires not over 500 hp. to attain the maximum of 1,160 rpm. The shaft to which these motors are connected is coupled to the pinion of a 5.8 to 1 herringbone-type reduction gear; therefore, the 7 ft. 6 in. diameter, 3 bladed Lambie bronze propeller will turn a maximum speed of 200 revolutions, giving the clipper a top speed, loaded, of 11 knots. The propeller shaft of 7 in. diameter Monel metal is 18 ft. 6 in. long. The flexibility of this drive is considerably greater than that of a direct-connected Diesel engine. Any propeller speed between 18 and 200 revolutions, either ahead or astern, is automatically selective through movement of the controls. The 60 hp. motor gives the vessel a speed of 5 knots, the 250 hp. a speed of 9 knots, and 500 hp. motor the maximum speed of 11 knots. In brief, the reason for the "cascade-assembly" is that the starting current demand on the large motors is less than the full load running current, and the AC machinery is more rugged than DC.

It will be noted from this, that despite the fact that the three Atlas Diesels will deliver a combined power of 750 hp., propulsion demand does not exceed 500 hp. Thus there is ample reserve power for operation of bait pumps, three powerful refrigerating motors, brine-circulating pumps and other auxiliaries. The main motors drive through a Westinghouse model NSV marine gear unit, 500 hp., 1160/200 rpm., with self-contained thrust bearing and lubricating oil pump. This gear transmits the power with an extremely small loss.

The motor-operated controller and secondary resistors for the propulsion motors are contained in a compact cabinet mounted on the main deck at the head of the engine room ladder. The front panel contains all the necessary operating facilities and instruments for the engine room control station. The engineer can observe directly all of his machinery and the generator switchboard, to see just what performance his power plant is giving.

Normally the vessel is controlled from the pilot house, through a pilot house control stand. The control stand contains an indicator to show that the engineroom control has functioned, and on what speed point the propulsion motor is operating. It also contains an ammeter showing the captain exactly how much power he is putting into the screw, and a speed indicator showing the propeller rpm. at all times. The switch-

board is a factory-built job, incorporating in one board the generator control, power distribution, light distribution, motor starters, transformers, and miscellaneous equipment.

The Westinghouse generator switchboard includes an ammeter, voltmeter and field ammeter, an indicating wattmeter and a frequency meter for each of the three generators. The wattmeters make it possible to divide the load between engines, and the frequency meter is for use in synchronizing, and also as a continuous indication of engine speed. In synchronizing, the engine is brought to the correct speed by a remote control switch on the switchboard, and when correct speed and voltage are reached, the contactor is automatically closed in by means of a simple synchronizing relay panel behind the board. Synchronizing lamps and hand-operated switches are also provided for manual synchronizing in case of emergency. The power distribution panel is very compact by the use of type A.B.I. De-ion circuit breakers. This panel contains the 600 ampere propulsion feeder breaker, and 17 other power distribution breakers. The larger motors have separate breakers, and the smaller motors are grouped.

The starter panel contains 20 type DnW manual starters for motors under 10 hp. and 10 "Linestarters" for motors 10 hp. and above. Each "Linestarter" contains its own start-stop push button. This centralizes the control of the motors, and puts them all directly under control of the engineer. Careful ship design has permitted grouping most of these motors so they are within sight of the engineer standing at this operating station. Built into the back of this switchboard is the fathometer motor-generator set and the two 10 kva. dry type lighting transformers, one of which is a spare.

Auxiliary motors total thirty-seven, with a connected load of 290 hp. All of these motors, excepting a very few 1 hp. and below, operate on 440 volt, 3 phase, 60 cycles. The larger motors are Class II "Linestart," in order to reduce starting current, and the remainder are standard Class I squirrel-cage motors. The use of standard alternating current motors has greatly reduced the first cost, the control complications, and the maintenance on this ship.

All electrical equipment is built for marine service under tropical conditions, having moisture-resisting winding, non-corroding parts, and ball bearings. The compactness of the alternating-currrent motors and of the centralized control, along with the ability to place the three engines in their most advantageous position, regardless of the propeller shaft position, has resulted in an extremely roomy and well-arranged engineroom, and in the saving of considerable space and weight. In applying this drive it is absolutely essential that the speed-power characteristics of the hull be very closely known, as any variations from the projected curve will cause large variations in the load on the propeller motors. In this vessel, the variation in actual power requirements from those prophesied by the shipyard and William Lambie, propeller designer, was less than three percent.

The electrical installation and hook-up was inspected and approved by Marion W. Smith and Ralph Kelly, vice presidents of the Westinghouse Co. in charge of engineering and sales, as personal guests of Captain Hall.

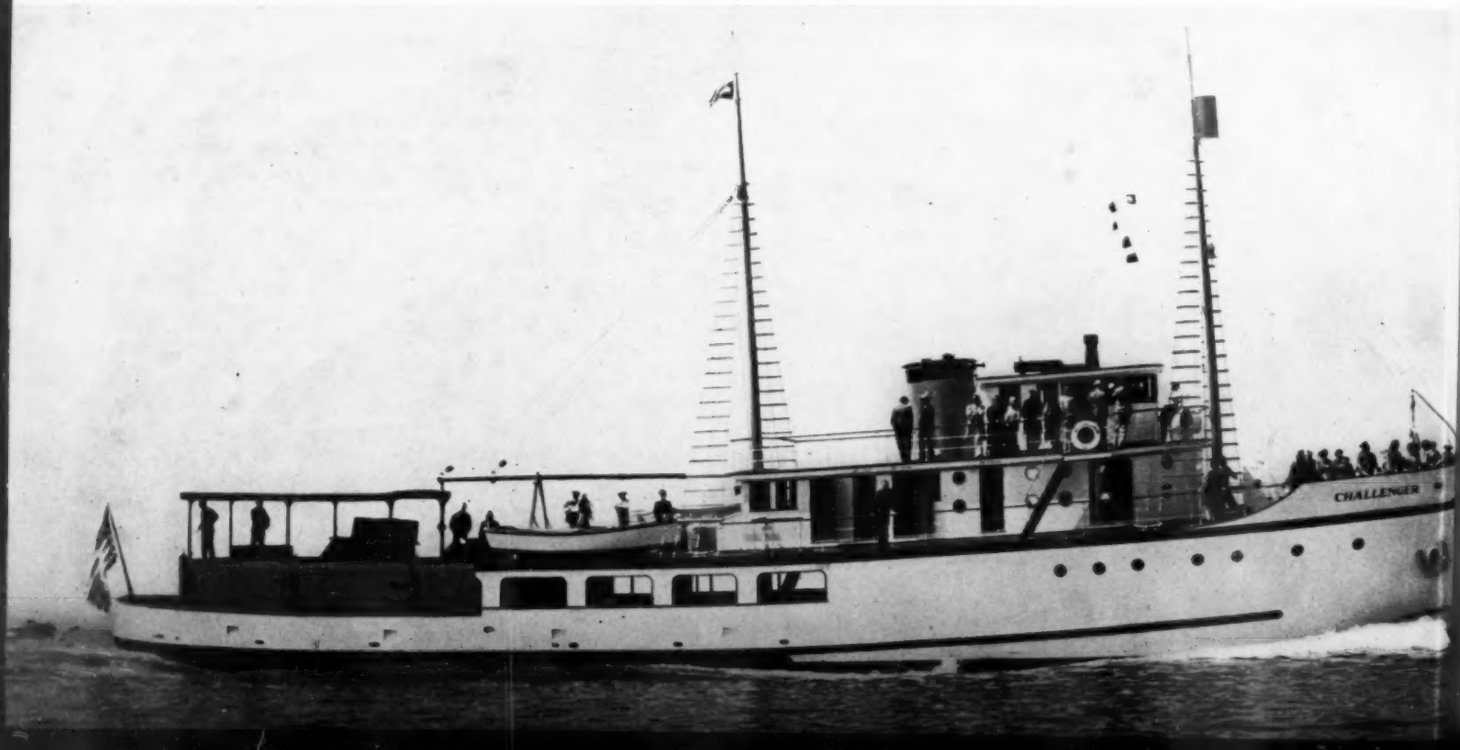
Special equipment includes a fathometer deep-sea sounding device, electric steering control, commercial wireless set of world wide range, radio direction finder, CO-Two fire protective system, and Ingle oil burning range in galley. Two net skiffs and an 18 ft. power dory are carried on deck.

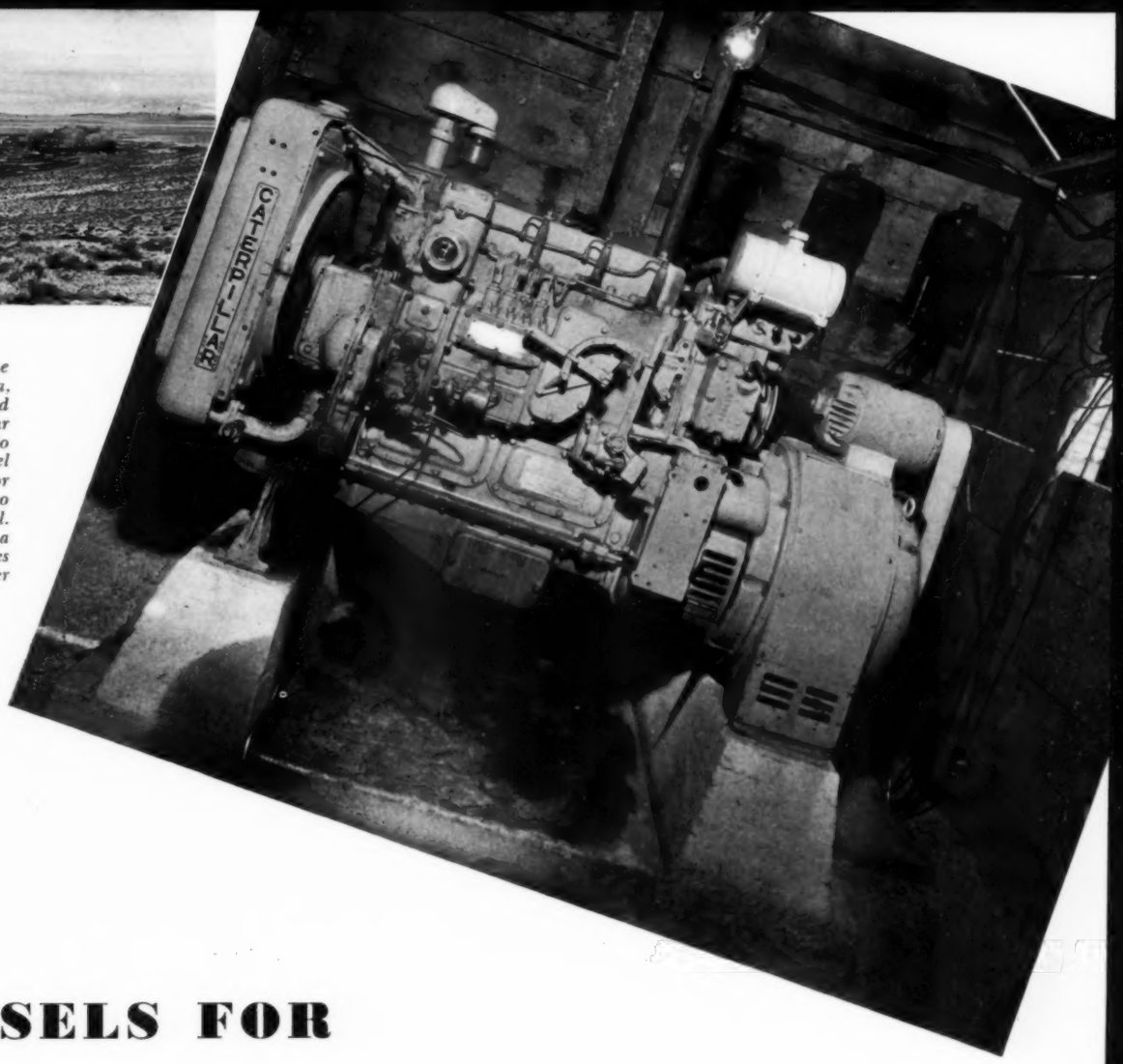
Refrigeration, by the SD Marine Construction, is of the "three-step" system; sea-water cooling, sharp-freezing, and "dry" holding.

Through a three-phase cooling system, tuna, freshly caught and uncleaned, pass through the main hatch to the desired tank of cooled water at 28 deg. F., which removes body heat. This chilled sea water is discharged overside, tank "topped" and zero-brine substituted, lowering the tank's temperature to 20 deg. F. within a few hours. Further refrigeration is maintained, after brine is drawn off, by the ammonia coils, until point between 8 and 10 deg. below zero is reached; hard freezing the catch for dry-condition delivery port discharge. Exteriors of fish holds have 4 in. sheet cork insulation, and interiors are treated with Gunite.

The shaft-alley divides the fish-hold of twelve tanks, six on a side. Access to the 18-ton tanks is through hatches, closed by steel covers. This provides quick dispatch for cannery unloading, the cargo being hoisted by ship's boom through main and secondary decks to dock-side flumes.

The 128 ft. Atlas-powered Diesel-Electric Tuna Clipper "Challenger" on her trial trip.





The above is a view of the village of Lund, Nevada, which receives its light and power from the Caterpillar Diesel-electric set shown to the right. This compact Diesel supplies light and power for thirty-five residences, two business houses, and a school. In operation fifteen hours a day, the Diesel engine uses about a gal. of 10c fuel per hour.

DIESELS FOR VILLAGES

By WILL H. FULLERTON

THROUGHOUT Nevada, Utah, and other sparsely settled States, where there is awesome scenery and few to see it, centuries of erosion have created fertile little pockets between the ranges of barren, snow-covered mountains.

Here and there villages have sprung up—absurdly small villages to the way of thinking of an Easterner. Many of them have not more than 150 inhabitants but they are, nevertheless, the cultural and economic centers of vast land areas. Ranchers and prospectors from miles around look to these little communities as a source of essential supplies and mail. Railroads, creeping out across the plateaus, bring in food stuffs, letters, equipment; and go off loaded with cattle and minerals.

A year or two ago, a transient passing through these isolated towns, might have imagined himself transported to a civilization a century behind the times. Aside from the modern appearance of an occasional school or civic structure, the villages dozed in their niche-like valleys; taking business as it came, and very much lacking in any outward signs of aggressiveness. No industry was courted, and none came, for there was no power to support them. Water was derived from occasional little streams, meandering their treacherous course between willows and boulders. Or, if the community was situated in a particularly advantageous spot, deep-sunk wells could bring up enough for human essentials.

Today, however, there is a strange kind of an industrial revolution changing the face of the clusters of civilization that infrequently dot the high plateaus. Electric signs have begun to sprout out along main street; back streets are bright long after dark, with the reflected lights of residential windows. Industry on a very moderate scale is on its way toward making each community more self-sufficient.

No high lines have been brought into these towns; but the new light is not from the yellow-burning oil lamp. Poles and wire are going up here and there; carloads of electrical equipment—refrigerators, fans, heaters, irons, toasters, lamps—are rolling out across the mountains. Merchants are carrying new, extensive lines of light globes and kitchen equipment.

Lund, Nevada, as an example, nestles at the base of a sweeping rise of mountains. The traveler following State Route No. 6, can see it miles away; because its two-story buildings and its old cottonwood trees tower above the familiar sage brush of the country. Lund harbors 195 souls, according to the 1930 census, and its boundaries are vague, with dusty streets ambling nonchalantly away from the cluster of houses, out into the flat ranch country.

The town does not have much of an industrial nature. There are stockyards, a freight depot, a flour mill, a postoffice, a garage, a couple of service stations and general stores as well as a few residences. From year to year things have changed very little, with both the population and the appearance of the community at a point of stagnation.

Udell Gardner, one of the local business men, has had different ideas about that, however, and last December he went to work on a project. He created the Lund Light and Power Co. and set it up to the task of bringing the civilizing influence of electricity to the town.

Into Lund, on December 10th, last year, rolled a complete power plant in a comparatively small crate. The Caterpillar Diesel Electric Set, capable of generating 15 kilowatts, was set up in a shed, turned over a couple of times, and then put to work. The unit, which consists of a four cylinder Diesel engine, directly coupled to a 440 volt, three phase generator, is self-regulating, and requires no additional equipment other than a circuit breaker. Mr. Gardner, pleased with the possibilities, set out to find customers.

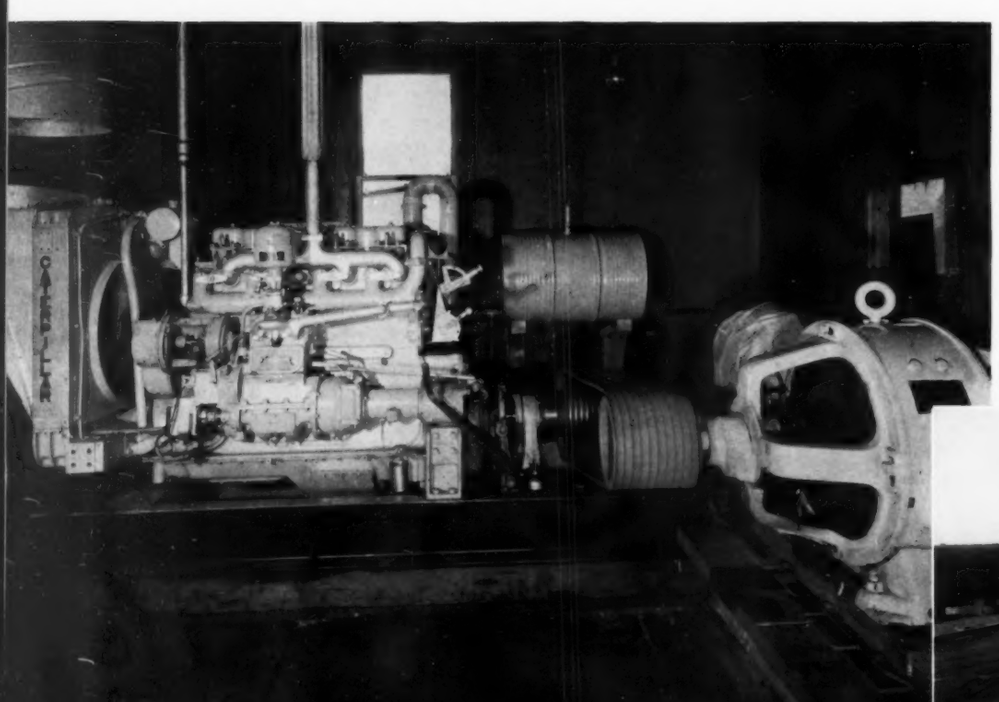
His own business was the first one; thereafter, things turned into a riot. As fast as lines could be strung, customers came on to them. Soon, 35 Lund residences, the local school, and two business houses were listed as the Company's customers. By the spring of 1940, almost every dwelling and business house in town was on the line. A new cold storage plant and creamers, being considered to take care of the community's extensive dairy business, was a potential customer. The flour mill, largest consumer of them all, had expressed its intention to come into the fold in the fall.

After just one year of existence, Lund Power and Light Co. was finding it necessary to consider more than doubling its generating capacity, because of the tremendous demand.

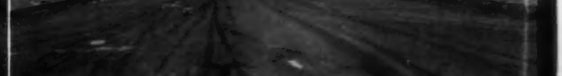
A Company called "Kelley and Rabaleati" did about the same thing in Eureka, Nevada, but there, with a population of 600, two 20 kw. Caterpillar Diesel-Electric Sets were put to work. When the load is light one engine is used; when it is heavy, both are on the line.

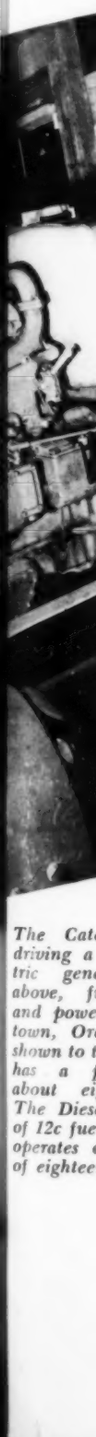
Eureka is a thriving little town, directly on the Transcontinental Route; and the availability of electric power has vastly increased the community's transient business. Brightly lit restaurants call in the tired tourists for relaxation. Service stations find their business constantly increasing through the advertising medium that light gives them. And of course, the city's residents live much more comfortably than before. All of the business houses, public buildings and homes, rely on these new type utility men for power.

About eighty families live in cozy Orderville, Utah, which is an attractive village, snuggled down between ranges of weather scarred mountains. The Orderville Power and Light Co., under Rulon J. Carroll, had a hard time making ends meet with a steam engine generating current. But Mr. Carroll installed a Caterpillar Diesel generator set in 1938, and since then things have been booming. Vee-belted to the 40 kilowatt generator, the four cylinder, 80 hp. engine supplies light and power for business houses and almost every one of the eighty families within the city limits. It cost Mr.

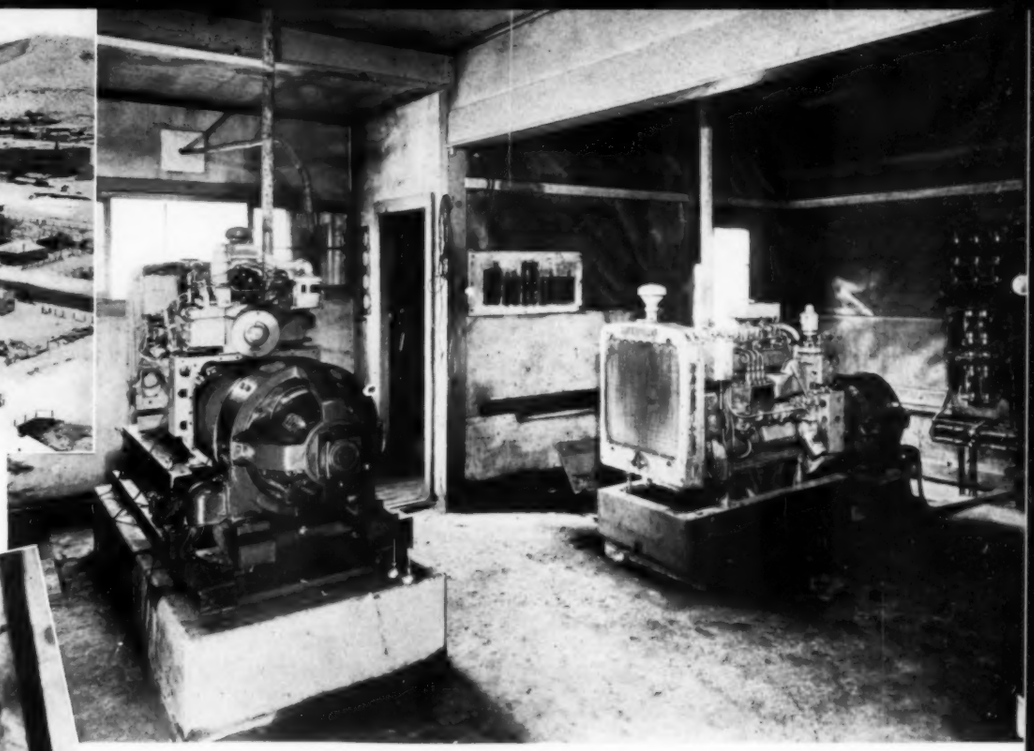


The Municipal Lighting Plant of Pukwana, South Dakota, shown below, is equipped with a Caterpillar Diesel engine (shown at left) with Westinghouse generator.

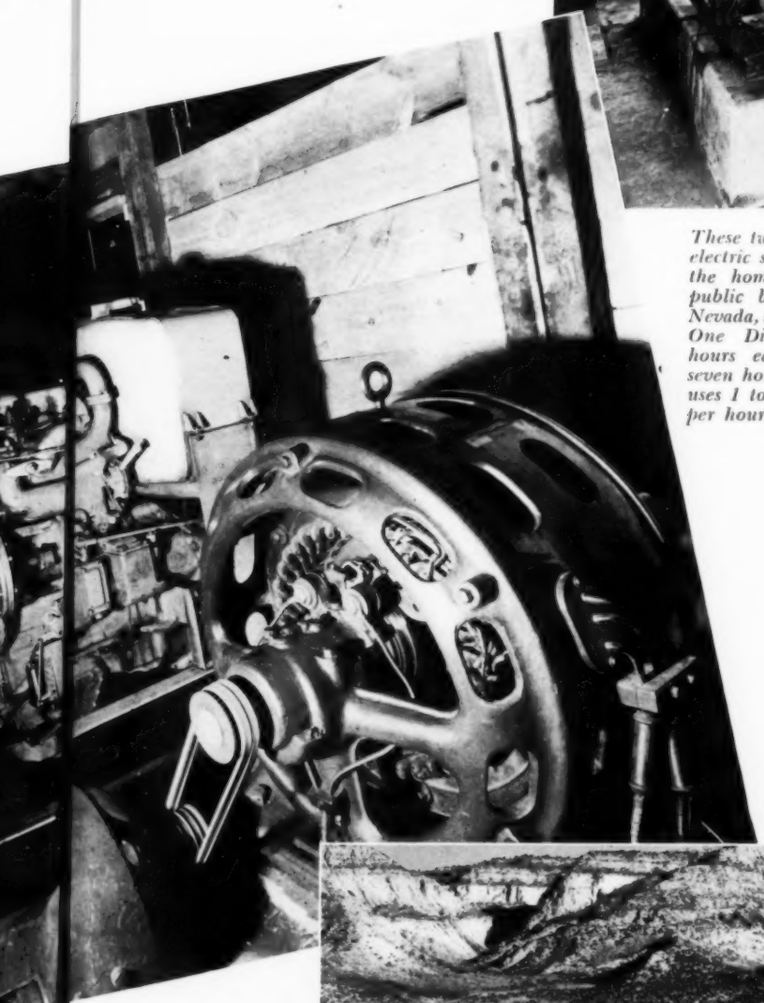




The Cat driving a tric gen above, f and powe town, Or shown to has a about ei The Dies of 12c fue operates of eightee



These two Caterpillar Diesel-electric sets furnish lights for the homes, business houses, public buildings in Eureka, Nevada, illustrated at top left. One Diesel operates eight hours each day, the other seven hours, and each engine uses 1 to 1½ gals. of 9c fuel per hour.



The Caterpillar Diesel driving a General Electric generator, shown above, furnishes light and power for the tiny town, Orderville, Utah, shown to the right, which has a population of about eighty families. The Diesel uses 2 gals. of 12c fuel per hour and operates on an average of eighteen hours a day.

Carroll only about $.24 for fuel an hour to keep the lights in Orderville burning.

The idea has spread all over the country, wherever towns are small and power scarce. The great northwestern plains are watching their local utility men improve the service and increase the profits.

Pukwana, South Dakota, which has for years had a private power plant, cut operating costs $4000.00 a year by replacing a spark ignition oil engine with one of the Caterpillar Diesel Generating sets. Here, with a load that varies from 7 to 30 kilowatts, the average amount of fuel burned cost about $.15 an hour.

H. J. Wennerstrom of the Hope Municipal Light and Power Co. at Hope, North Dakota, takes care of the entire needs of about 550 citizens with his plant. The 40 kw. Caterpillar Diesel D8800 Unit, that he employs, runs twenty hours every day and puts out an average of 22 kilowatts over that period—sometimes working at capacity, and sometimes idling along under a light load.

With a suitable, self-contained power plant, both inexpensive to buy and operate, these small town utility men are increasing in number every week, and bringing conveniences to the isolated Western Plains that compare favorably with those in the thickly populated districts. It is a new industry that is going up quickly, and that is turning on new lamps all over the nation.

"JENNIE WILSON"

By WARREN GLEASON

EVER since the days of the speedy, seaworthy sloops and schooners that brought about the development of the famous racing yacht *America* nearly a hundred years ago, the pilot boats of the American seaports have been renowned the world over as able, dependable craft.

Though pilot associations and sensible business methods have eliminated the wild, helter-skelter competition of the former days—when pilots frequently raced hundreds of miles into the ocean, competing for the prized and profitable honor of guiding some celebrated clipper or liner into port—nevertheless, the matter of morale and corps pride is still reflected in the performance and appearance of the boats in the American pilot service.

There is sound reason here, far removed from pure sentimentality: the pilot boat is the first tangible bit of America seen by visiting or home-coming eyes and must represent the nation fittingly. And aside from mere appearance, these boats must be able seaboats. While it is true that the modern pilot boats ordinarily make only short off-shore passages, that brief voyage over a harbor bar or through the tide-rips off the mouth of some great river may demand the maximum in seamanship. Sometimes a liner or freighter is delayed by accident or weather, and the pilot boat must be able to stay at its appointed post and take whatever comes until the pilot is able to board the incoming ship.

Passengers aboard liners approaching the port of New Orleans have many words of praise for the smart and beautiful pilot-boats which meet them some miles off the mouth of the Mississippi, and of these boats the *Jennie Wilson* and the *Underwriter* are the pride of the fleet. Somewhat challenging to credulity, therefore, is the statement that the *Jennie Wilson* is probably the oldest pilot-boat in active service in the country, if not in the world; with the *Underwriter* running her a very close second.

The *Jennie Wilson* was built in 1879, at the yards of John H. Dialogue, in Camden, New Jersey, her construction being supervised by Thomas R. Hand. She was the first steam pilot-boat ever built in this country; the framing and plating of her hull is of charcoal iron, all riveted, as this was before the days of arc-welders. The soundness of this hull today after over sixty years of service speaks eloquently for her designers and builders, as well as of

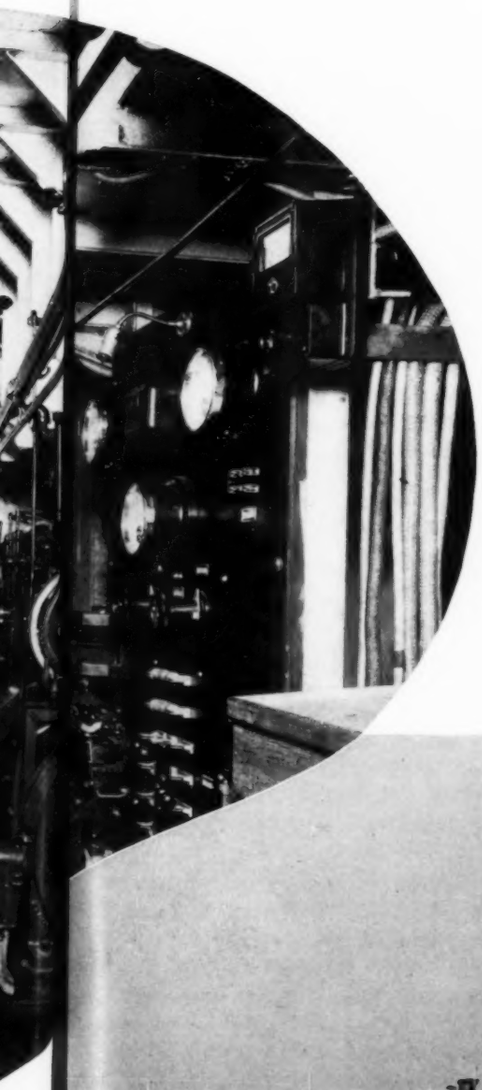
Engine room view showing the Atlas Imperial propulsion engine, left; and the auxiliary unit, right; with Quincy compressor mounted above the Crocker-Wheeler generator. Also Alnor pyrometer, upper right.

Interior of one of several comfortable cabins on the "Jennie Wilson." Note the radio.

The "Jennie Wilson" on trial run after being repowered and modernized throughout.

the durability and rust-resisting properties of good wrought-iron. The overall length of the *Jennie Wilson* is 86 ft., her beam is 18 ft., and her draft is 9 ft.

The original power plant was a compound steam engine, with a high-pressure cylinder of 15″ and a 26″ low-pressure cylinder. Two years after the building of the *Jennie Wilson*, the *Underwriter*, a sister ship, was launched, of identical design, construction and power-plant, and built at the same yards. With the towering smokestacks of the olden days, both boats were familiar sights off the mouth of the Mississippi for many years.



In 1937, the *Underwriter* was re-powered with an Atlas Imperial Diesel through Arthur Duvic's Sons of New Orleans. The satisfactory performance of this veteran boat with her new type of power determined the pilots' association to modernize the *Jennie Wilson* as well, and, in 1940, she was accordingly hauled out at the yards of the Canulette Shipbuilding Company at Slidell, Louisiana. A completely new arc-welded steel deck, trunk and deckhouse were fitted, with a new stack designed in the modern manner. Again Arthur Duvic's Sons made a Diesel installation, this one being an Atlas Imperial full Diesel direct-reversing engine of six cylinders, 13″ bore by 15″ stroke, rated 400 hp. at 300 rpm. A Guthans-gland-equipped steel shaft is used, with a Columbian bronze motorship propellor of 72″ diameter and 57″ pitch. With this Diesel-Driven three-blade wheel, the *Jennie Wilson* now steps along at a speed of 11½ knots.

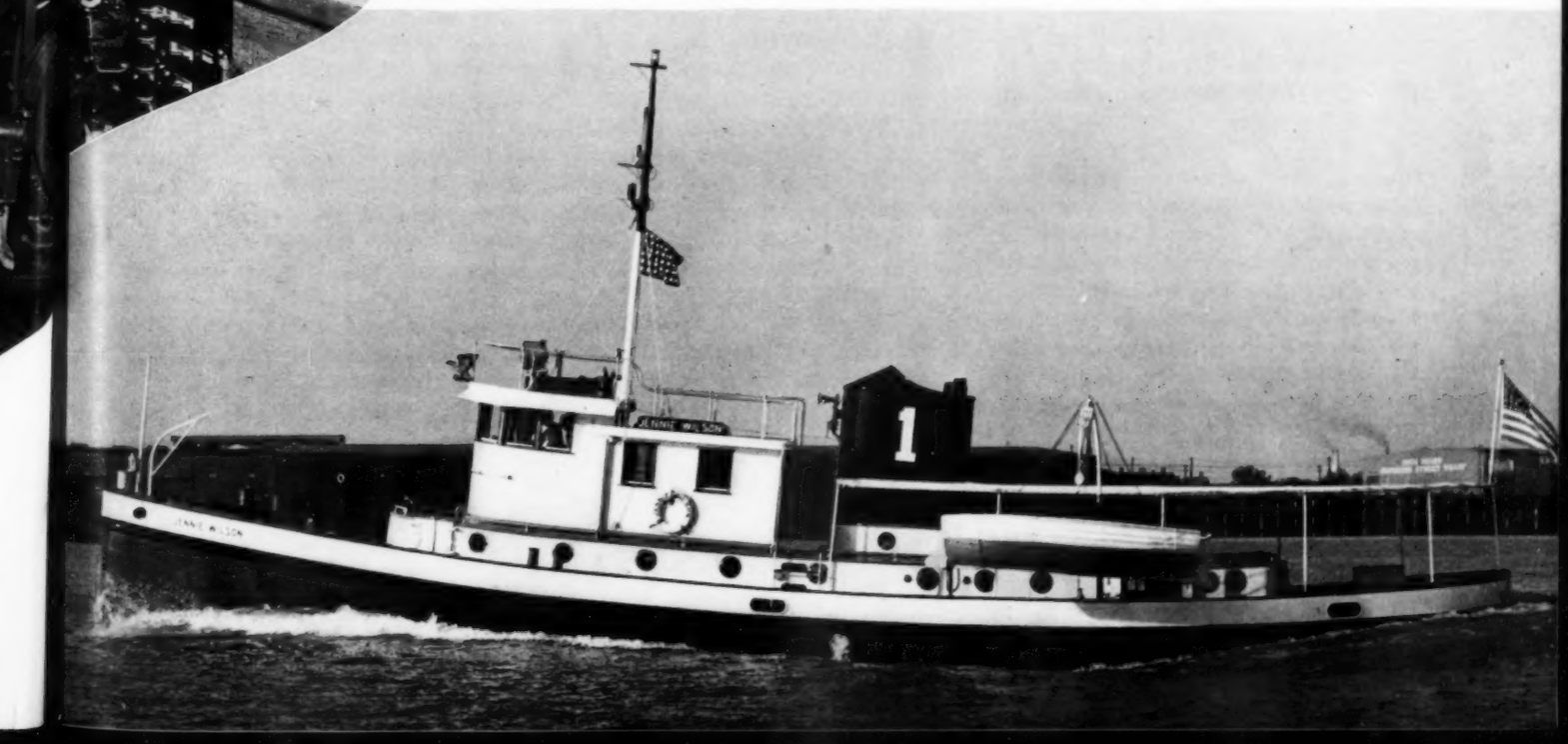
This engine uses the Atlas common-rail solid fuel-injection system and is equipped with the Cuno fuel oil filter and a De Laval centrifugal lube oil reclaimer. Alnor pyrometers, made by the Illinois Testing Laboratories, Inc., are fitted throughout. The cooling system is closed-circuit, employing a Sims heat exchanger and a 3″ Weimar reversible pump supplying 200 gallons per minute. A Viking transfer pump is used for shifting fuel oil from the main tanks to the day-tank. A Maxim silencer of the spark-arrestor type muffles the exhaust.

Auxiliary power is also Atlas Imperial Diesel, being a 2-cylinder 35 hp. engine driving a combination generator set and air compressor, using a Crocker-Wheeler 15 kw. generator of 115 volts and the Quincy 2-stage compressor supplying 30 cfm. In this arrangement, direct drive is used for the generator and a clutch-coupled V-belt for the air-compressor. Another Crocker-Wheeler generator of 10 kw. for charging the Edison batteries is shaft-driven from the main motor.

Other auxiliary equipment includes a 3″ Worthington Monobloc centrifugal pump for fire protection. This is driven by an individual 15 hp. electric motor and will supply 275 gpm. at a pressure of 21 lbs. The windlass is a No. 3 marine pump-brake ship-type; a 19″ Carlisle-Finch searchlight using a floodlight bulb is an essential piece of equipment on this pilot-boat, as is the Triplex Doran-Cunningham air-whistle. A Columbian electric toilet is installed in the officers' quarters, with an additional pump-type toilet for the crew.

The interior of the *Jennie Wilson* is neatly and beautifully finished, with an eye to comfort as well as utility; all openings are screened throughout and all cabins are insured against cold weather by the Crane Company's hot water boiler and automatic oil burner.

With her new power and equipment, the *Jennie Wilson* is a boat that can come and go at will; anywhere. According to the boat committee composed of members of the Associated Branch Pilots, under whose supervision the rebuilding of the *Jennie Wilson* was executed, the pilots have every reason to be proud of her. When a boat at sixty-one years of age is as strong as ever in hull, far more powerful and better-looking than new, her future should be as long and busy and interesting as her past.



BRYAN, OHIO

By WILLIAM H. GOTTLIEB

IT IS the ambition of Bryan, Ohio, officials to operate a municipal power plant that can serve as a model for the entire Midwest. This Northern Ohio community of 5600 population took a long step toward that goal this September with the installation of a giant 3200 hp., two-cycle, air-injection Nordberg Diesel. Since the plant already contained two 1500 hp. Nordbergs and a 520 hp. Busch-Sulzer, the new acquisition brought the plant capacity up to 6720 horsepower.

Bryan deserves primacy in the field on the basis of long experience with Diesel engines, as well as for the quality of its present equipment. The city has had a municipal water works and power plant since the turn of the century. For a few years, steam engines were used as prime movers, but in 1907, the city installed its first Diesels, two 225 hp. engines, products of the American Diesel Engine Co.

In 1911, a 450 hp. Diesel, manufactured by the Lyons-Atlas Company, was added to the plant. The first of the engines still serving the city is the 520 hp. Busch-Sulzer installed in 1919. Then, in 1932, Bryan purchased its first Nordberg. It was not until 1935, when the city acquired a second Nordberg that the original American Diesels were removed. The old Atlas was taken out this year prior to the installation of the 3200 hp. Nordberg. The new engine is notable not merely for its size but for some novel elements in its design as well as for the completeness of its auxiliary equipment.

Bryan has spared no effort to make this a complete, highly efficient installation, commensurate with the city's aspirations.

The engine is an 8-cylinder model, 21″ bore, by 29″ stroke, developing its rated horsepower at 225 rpm. It is constructed with A frames, common to Nordberg engines, with individually-cast cylinders securely bolted to the frames. Pistons are of the cross-head type. The engine rests on a large concrete foundation set in the basement floor. Many of the auxiliaries are located in the basement around the engine. The oil cooler and heat exchanger are set vertically in a well that extends through the engine-room floor to the basement floor. The day tank, fuel filter, lube oil pumps, lube oil filter, lube oil reclaimer, raw water and jacket water pumps are all in this basement section.

The Allis-Chalmers flywheel type generator, directly-connected to the engine, is rated at 2250 kw., 80% p.f., 2300 volts, 611 amps. It is belted to a 40 kw. Allis-Chalmers exciter.

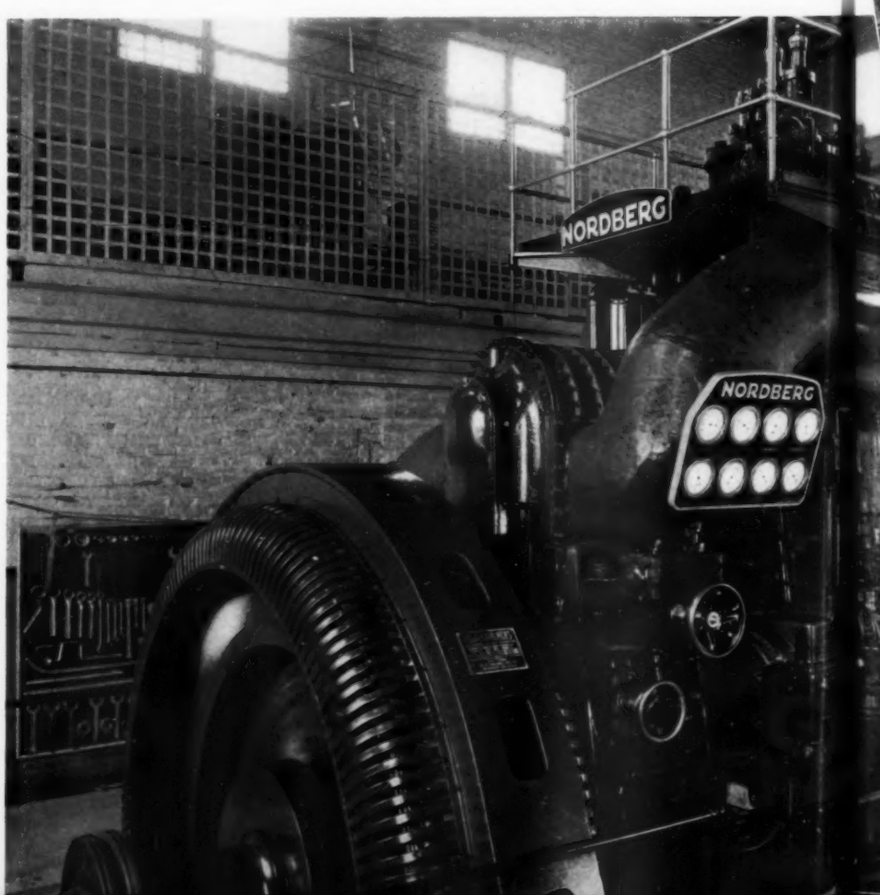
A notable feature of the engine's fuel system is the hydraulic system for actuating the fuel injection valves instead of the mechanical means as normally employed. Adjacent to the regular American Bosch fuel pumps are smaller Bosch pumps connected to the actuating plungers which, in turn, open and close the fuel valves.

A Woodward Type 1C hydraulic governor, mounted on the front and at the generator end of the engine, shifts the control rack of the fuel pumps, thereby controlling the effective stroke of the plungers, delivering the proper quantity of oil to the cylinders in accordance with the engine load.

Fuel for the entire plant is stored in four larg underground tanks: one 70,000 gal., one 40,00 gal. and two 10,000 gal. The fuel for the thr old engines is pumped to day tanks on a hig platform in the engine room by transfer pump which are started and stopped automatically b a Cutler-Hammer pressure control arranged t keep the level in the tanks above a predete mined point. Fuel flows to the 200 gal. tan for the new engine by gravity; a Cutle Hammer float-operated control regulates th admission valve. All fuel for the plant pass through a 24-hour Pittsburgh Equitable mete Bryan uses a Michigan crude oil of 300 vi cosity. From the day tank, fuel for the larg engine flows to a pump which is chain-drive off the lube oil pump, and is then forced dow through a duplex Nugent pressure filter and i finally delivered to the injection pumps.

The lubricating oil pump, driven by chai from the crankshaft, takes oil from the rese voir at one end of the engine bedplate, force it through a strainer, then through the Schutt & Koerting cooler, and then to the bearing

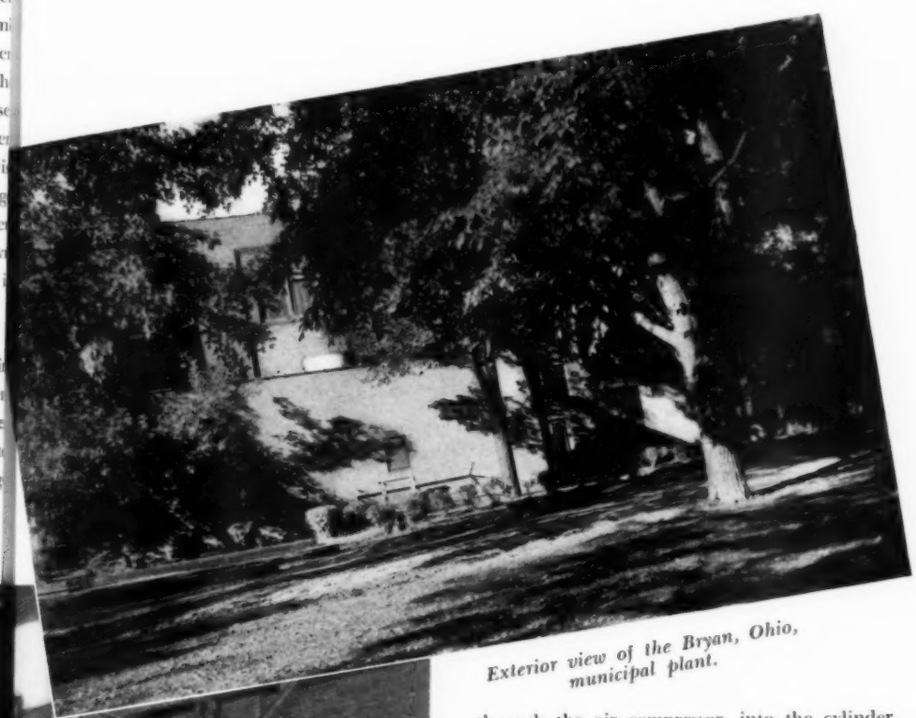
The new 3200 hp. Nordberg Diesel at Bryan, Ohio.



and circulated through the piston heads which are oil cooled. A Viking auxiliary lube pump driven by an Allis-Chalmers motor supplies lubrication when the engine is started and is also used to keep up lube oil pressure when the engine is being slowed to a stop. A Hilco reclaimer is arranged for continuous by-pass operation. Texaco Algol is used in the crankcase. Each cylinder is lubricated by an individual Manzel force-feed lubricator, Model 9-82D. Texaco Ursa, medium heavy, is used for cylinder lubrication.

The Hilco Oil Reclaimer in the Bryan plant is direct-connected to the new 3200 hp. Nordberg Diesel engine for continuous or intermittent bypass purifying. This installation is going to keep the oil in the engine perfectly clean at all times, and will eliminate the necessity of periodic oil changing and engine cleaning, because the Hilco removes contamination as fast as it is formed.

The cooling system, of course, is of the closed type. An Allis-Chalmers centrifugal pump delivering 1200 gpm. against a 100 ft. head circulates the jacket water through the following course: from the hot well through the pump, through the Schutte & Koerting heat exchanger, through the oil cooler, through the air cooler,



Exterior view of the Bryan, Ohio, municipal plant.

through the air compressor, into the cylinder jackets, and back to the hot well. Makeup water is drawn from the city's artesian wells and put through a Permutit softener. Raw water for the cooling system is circulated between the heat exchanger and two large spray ponds by an Allis-Chalmers pump supplying 800 gpm. against a 115 ft. head. This pump is driven by an Allis-Chalmers 40-hp. motor.

Intake air is silenced by a Burgess Snubber, passes into an air house outside the plant, through American air filters, then into the plant basement to a large chamber in the engine foundation. The air is drawn up by a scavenging air pump and supplied to the cylinders under pressure through a header. Exhaust gases travel from a header down through the floor and out to a vertical Burgess Snubber at the rear of the plant.

The engine is equipped with an Alnor pyrometer with selector switch and a full complement of Motoco thermometers and U. S. Gauge Co. pressure gauges, thus permitting the operator at all times to maintain correct operation of the engine and its auxiliaries.

The three Nordberg engines have Mercoid alarm controls for lube oil and jacket water. The switchboard, constructed by the Marquette Electric Co., is equipped with General Electric switches and Weston instruments. Allis-Chalmers rocking-contact voltage regulators are provided for all the engines.

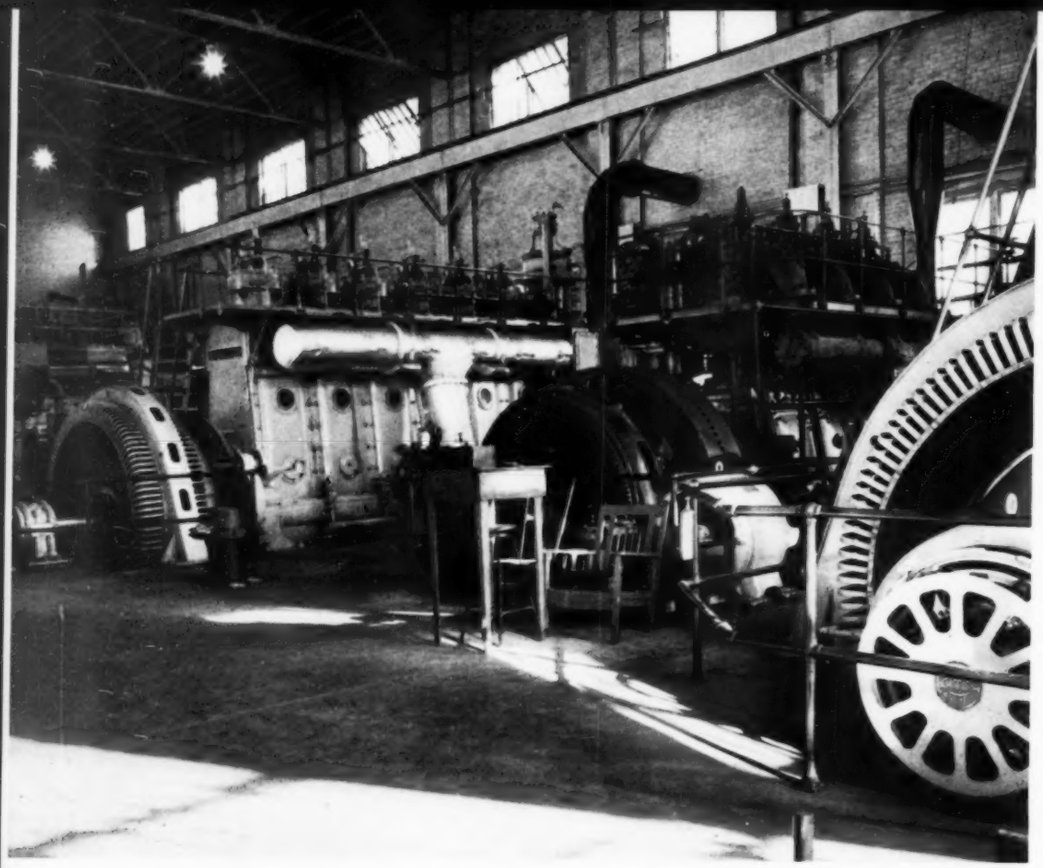
The first Diesels installed in the plant did not have air compressors on the engine and so two Ingersoll-Rand two-stage compressors, belted to 50 hp. Allis-Chalmers motors, were used to supply fuel injection air. Later engines had their own built-in compressors but the old Ingersoll-Rands were still serviceable and were retained to supply starting air.

Even before the acquisition of the new engine, Bryan boasted a Diesel plant of respectable proportions. The two 1500 hp. Nordbergs are two-cycle, air-injection engines of six cylinders, 17″ x 25″, operating at 257 rpm. They are direct-connected to 1250 kva. Allis-Chalmers generators with direct-connected Allis-Chalmers exciters.

The Busch-Sulzer is a four-cycle, four cylinder, 17″ x 28″, air-injection Diesel, rated at 520 hp. at 220 rpm. and is directly connected to a 320-kw. Allis-Chalmers generator with belted exciter.

The Busch-Sulzer and the older of the Nordbergs have governors produced by the engine builders while the second Nordberg has a Woodward governor similar to that on the new engine. The two 1500 hp. units employ Nordberg constant-stroke, variable-speed fuel injection pumps. Lube oil pumps on the three older engines are motor-driven; the Nordbergs have Northern pumps driven by Allis-Chalmers motors while the Busch uses two Roots-Connersville Blower Corp. pumps driven by General Electric motors. The Nordberg cylinders are lubricated by Manzel mechanical lubricators while the Busch has a mechanical lubricator supplied by the engine builder. Schutte & Koerting coolers keep lube oil of all the engines at the proper temperature. A DeLaval centrifuge is arranged for alternate by-pass operation for all three engines.

Cooling water pumps for the three older engines are located outside the plant and consist



General engine room view. There are four Diesel generating units, totalling 6720 horsepower at Bryan, Ohio.

of one 1200 gpm. Fairbanks-Morse pump driven by a 50 hp. F-M motor for jacket water and a similar pump and motor for raw water. The cooling system for the 1500 hp. Nordbergs is similar to that of the new engine. Originally, the Busch-Sulzer pistons were water-cooled but they have been changed over to oil cooling.

Exhaust gases from all three engines pass under the floor and through ducts to a large, vertical brick stack which serves as a common exhaust vent. The Nordbergs are equipped with Alnor pyrometers to measure exhaust temperatures. Intake air enters a three-chamber air house outside the plant, passes through American air filters and then through ducts to the engines. If, for any reason, the running engines begin to slow down to a stop, the drop in voltage automatically turns on battery-operated lights near the switchboard and emergency engine. The plant operates with a six man personnel: three operators, on 8-hour shifts; one chief engineer; one mechanic and one extra man.

It is estimated that Bryan has an investment of $700,000 in its power system; $570,000 in the plant alone. At the outset, the city issued $30,000 in general tax bonds. At present, there are $170,000 in bonds outstanding for purchase of the new equipment but these are a lien only on plant revenues. Thus, $530,000 has been paid off from plant earnings.

The financial position of the Bryan power system has been consistently strong. Every year without exception, shows an operating surplus. The result and possibly the cause has been a constant reduction in rates to consumers. Ten years ago, the householder paid 7 cents per kwh. for the first 50, 5 cents for the next 1000 and 3 cents for all over 1050 kwh. Five years ago, the lighting charge was 5 cents per kwh. for the first 100, 3 cents for the next 900, and 2 cents for all over 1000 kwh. Today, the rate stands at 5 cents for the first 50, 4 cents for the next 50, 3 cents for the next 400, 2½ cents for the next 500, 2 cents for the next 1000 and 1½ cents for all over 2000 kwh. In addition Bryan allows a 20% discount on all bills paid during the month the bill is rendered. The result of Bryan's Diesel operation has been a rate listed by the Federal Power Commission as one of the lowest in the United States.

Low cost of power has encouraged Bryan's growth as an industrial community. The current power rate is 3 cents per kwh. for the first 2000, 2½ cents for the next 2000, 2 cents for the next 2000, and 1½ cents for all over 6000 kwh. Companies dependent upon the city's power include a novelty furniture manufacturer, a candle factory, a manufacturer of filling station equipment, a candy factory, several grain elevators and many other manufacturing establishments. The growth of the load has been phenomenal. Five or six years ago the annual kilowatt hour production did not exceed 1,500,000. In 1939, it reached 5,538,000 kwh. The expected figure for 1940 is 7,500,000 kwh. Contracts signed with new industrial consumers promise a load of nearly 10,000,000 kwh. for 1941.

Men as well as machines have seen long service in the Bryan power system. O. L. Kelly, chairman of the Board of Public Affairs, has participated in plant policy making for the past 14 years. Arthur Castor, chief engineer, has been a plant operator for thirty years. Merle J. Miller is now the Superintendent, having succeeded Sam E. Folk, who died early this year after serving for thirty-eight years in the Bryan plant.

The 1500 hp. Nordberg Diesel installed at Bryan, Ohio, in 1935.

SEABOARD NOW HAS TWENTY-ONE NEW DIESEL-ELECTRIC LOCOMOTIVES

ANOTHER INSTANCE OF HOW DIESELS ARE HELPING THE RAILROADS

THE Diesel Engine has proved to be a life saver for many of our progressive railroads. It has decreased operating costs, increased passenger traffic, and materially improved net profits. The Seaboard Railway started out with Diesel trains in a mild way last year; now they operate twenty-one Diesel Electric Locomotives.

On December 15, 1938, Seaboard introduced Diesel-electric locomotives on the East Coast Orange Blossom Special. Two Electro Motive A-Units and one B-Unit, totaling 6,000 hp. are used to haul this train. A total of nine units are required to handle the three complete trains necessary for complete round-trip service between New York and Miami. The Diesel units operate between Washington and Miami. The trip between New York and Washington is handled by Pennsylvania electric locomotives.

On February 2, 1939, the Seaboard introduced the first streamlined coach train in the east—The Silver Meteor. This train was hauled from Washington to Miami by one Diesel-electric A-Unit. During the first year, three Diesel-electric A-Units were required to handle the three complete trains for round-trip service. In December, 1939, the Seaboard also added Diesel-electric power to the West Coast Orange Blossom Special. One A-Unit and one B-Unit were required on this train. Six units were required for the round-trip service between Florida and New York. On December 1, 1940, the Seaboard Silver Meteor was doubled in capacity and greatly increased facilities to both coasts of Florida from New York. On that date, two Diesel-electric units were required to haul the larger train. Six units in all are necessary to handle the round-trip service on three complete Silver Meteors. The total number of new Diesel-electric units is now twenty-one.

The modern Power Plant building at Baird, Texas.

BAIRD, TEXAS

By V. M. ROBERTS

LONG recognized as the heart of the diversified farming, stock raising, and oil producing section in North Central Texas, Baird has achieved new prominence with the installation of the State's youngest Municipal electric light and power plant. When the lights were turned on recently for the first time for the dedication of the new football field, most of the City's 2,000 population was enthusiastically in attendance at the celebration.

The citizens of Baird are proud of the successful completion of their electric plant. Already they are seeing the fulfillment of the five-point purpose in installing the system: (1) To reduce the electric rates, (2) To establish a white way through the business area, (3) To install adequate residential street lights, (4) To pump water for the Municipal Waterworks Plant, and (5) To keep the profits from the electric utility at home.

Baird's citizens are equally pleased with the faithful performance of duty by their Mayor, City Secretary, and Councilmen, in overcoming the obstacles brought on by repeated litigation and delays due to the Power Company's interference. No better demonstration of confidence could have been made than was made when the voters returned their full Council to office while the City was having the hardest phase of its struggle to continue construction on the plant.

Because of their experience with the waterworks system, the City Council had been favorable toward the municipal ownership of utilities for some time prior to the installation of the electric plant. The Water Department is well-managed, and the profits from this source have made it possible to maintain the City Tax Rate at an average level. The city funds have not been sufficient, however, to take care of the costs of improvements needed by this progressive West Texas town.

During the spring of 1938, the city made a very complete investigation into the merits of a municipally-owned plant. It was learned that there were several neighboring cities which had installed their own systems which were now operating successfully. The towns visited had adequate white way systems, splendid residential street lights, paved streets, and comfortable city buildings, yet their rates for taxes were no more than that in Baird.

Later, convinced that the operation of such a plant in their city would solve several problems then before the Governing Body, the Council employed Albert C. Moore & Company, Consulting Engineers of San Antonio, Texas. The engineers began work immediately to prepare preliminary plans, specifications and estimates of cost for a complete and modern electric lighting plant and distribution system to be owned and operated by the City.

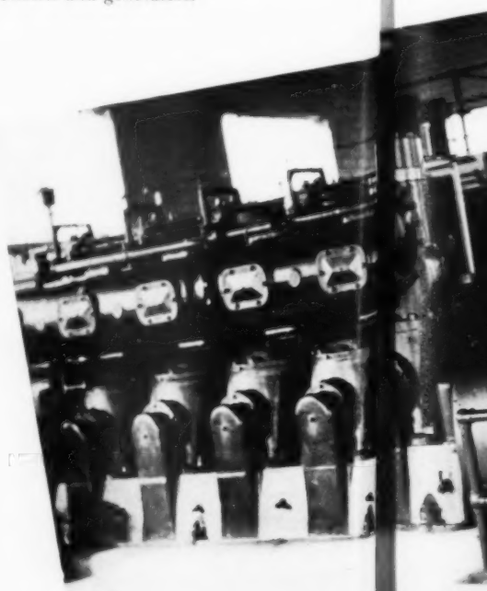
Following the presentation of the report, the City took immediate action to go ahead with the installation. The engineers were instructed to file an application with the Public Works Administration, requesting aid in financing the project.

After the P. W. A. engineers had completed their field check, it was recommended that a high voltage transmission line be run from the City Plant to the Octane Oil Refinery, situated six miles from the east City limits, and that this extension be included in the original plans. This was done, and a loan and grant of $165,454.00 was asked.

By this time the power company, which furnished electric service to Baird, was putting forth every effort to discourage the City and its citizens. Newspaper advertisements began to appear signed by the "Citizens Committee," a group composed of three citizens who were in sympathy with the power company.

Special representatives made calls on the house-

Interior view of the engine room showing the two 450 hp. Fairbanks-Morse Diesels and generators.



wives and business men and attempted to show that the City could not finance the construction of a plant in competition with the power company. The power company's franchise does not expire until 1955, and they indicated plainly that they had no intention of discontinuing service in Baird even though the municipal plant were built.

Undiscouraged, however, the City Council called an election for September 30, 1938, for the purpose of voting revenue bonds with which to build the plant. The days preceding the election were vibrant with street debates, mass meetings, and house-to-house canvassing. More than a thousand people gathered the night before election day and applauded speakers who espoused the cause of municipal ownership.

Interference from the power company and their followers became so acute that two attaches from the State Attorney General's Department were sent to Baird to investigate the power company's alleged activities. Then, as if a final shot to give stimulus to the City's cause, the Public Works Administration approved the City's application, just three days before the election, for P. W. A. Loan of $91,000.00 and a Grant of $74,454.00. The election carried by a majority of 200 to 127 in favor of installing the plant, and the City Council proceeded with confidence now in ordering final plans and specifications prepared prior to advertising for bids for the construction.

If the power company had interfered before the election, it was small compared with what was to follow. Almost immediately the City was faced with an election contest, wherein it was alleged by the power company and a few sympathetic citizens that the election was illegal, and the date for a hearing was set in the Forty-Second District Court in Abilene.

In the meantime, the City's engineers were instructed to make a complete inventory and evaluation of the Baird properties of the power company within the City Limits in compliance with a requirement of the Public Works Administration. This appraisal was made, a value was set on the Company's properties, and an offer of purchase, in excess of the actual physical value, was made to the power company. The offer was repeatedly ignored, and the City continued with plans to install their own plant.

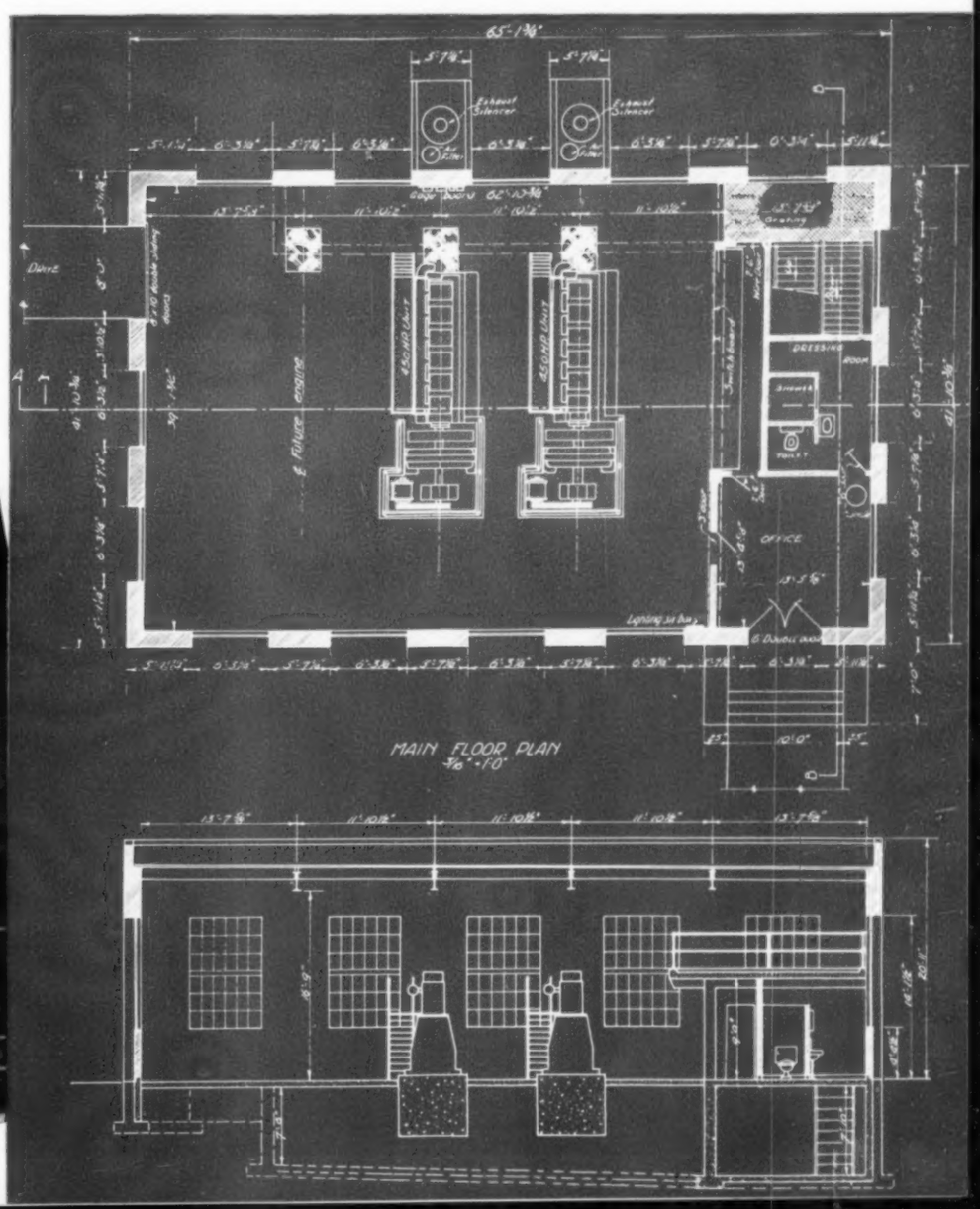
Upon completion of the final plans and specifications, and on advice from the Public Works Administration, the City Council set December 17, 1938, as the date for receiving bids for the construction of the new municipal power plant.

From the time the first case was set until a motion for a re-hearing on a second case was overruled by the Supreme Court, the litigation instigated to prevent the installation of Baird's Electric Plant is doubtless unsurpassed in the history of any town in the country.

From December, 1938, to August, 1939, the power company kept the City constantly defending its rights. Although there was never a decision made against the City, the power company managed to have a case pending continuously, which prevented the delivery of the Bonds to the Public Works Administration.

Notwithstanding discourteous treatment and attacks made on City Officials, plans were carried forward and contracts were awarded for the construction of the Plant and Distribution System, a transmission line to the City water wells two miles west of town, and a transmission line to the Octane Oil Refinery.

General layout of the Baird, Texas, power plant building.



The local conditions at Baird were rather unusual. The Octane Refinery Company had a connected load of 190 kilowatts and a peak load of 160 kilowatts. In addition, there were a number of motors of approximately 10 hp. each, used in air conditioning plants within the City. To accommodate these conditions, it was necessary that the engine and generator units be sufficiently large to take care of any sudden increase in load, and that a reliable standby unit be installed for emergency service.

Careful attention was given to the selection of a site for the power building. It was decided to build on a plot of ground 200 feet by 140 feet, two blocks east from the main business district. This is a good residential section of town, with well-improved streets.

The plant building—40 feet by 62 feet—was built on the north half of this lot. It is entirely fireproof with exterior of light buff face brick, with trim of artificial stone, chocolate brown brick, and stucco. The interior is of light buff glazed building tile.

The foundations are of reinforced concrete, and a partial basement and pipe gallery are provided to permit all piping and the principal electrical connections to be exposed.

The roof is feather-weight concrete slab, covered with a standard 20-year-guarantee build-up roofing. I-Beams, supported on brick and tile pilasters, carry the weight of the roof.

This building is unique in that it has a balcony of reinforced concrete across one end. Here are located a small workshop and tool room, and the station transformers. Beneath the balcony is the Plant Superintendent's office; also, dressing room, toilet, and washroom.

The stairway leading from the main operating floor to the balcony and to the basement is of steel grating, with non-skid treads. Removable grating was used over the excavated portions of the basement to provide light and ventilation.

Rails for a traveling crane were bolted to anchors supported by the roof I-Beams. This crane is a two-ton, hand-operated type with hoist, and the arrangement is such that equipment can be picked up at any location in the engine room or in the basement and carried conveniently to an outside door. The building doors are of tubular steel construction with steel frames. Windows are of ⅛" ribbed glass. By constructing a heavy sheet metal housing around the exhaust silencers and circulating air inside of this, it was possible to provide heat for the plant building.

The machinery installation consists of two 450 bhp. Fairbanks-Morse Diesel engines of six cylinders each, direct-connected to three-phase, 2400-volt, 60-cycle alternators, each with a capacity of 375 kva., which is equivalent to 300 kw. at 80 per cent Power Factor. Individual excitors were used for each unit. These are of 10 kw. capacity, and are driven with V-belts from sheaves on the outside of the outboard bearing.

Space was provided in the engine room for a third unit when needed, and rigid conduit was carried to the approximate location of the future generator before the floor was laid. The exhaust tunnels and pipe galleries are complete. The cooling system is closed. Cooling tower heat exchangers were installed and piped below the headers of a Marley Spray Cooling Tower, located near the rear of the building.

The jacket water is circulated by two close-coupled, motor-driven centrifugal pumps, either of which has sufficient capacity to properly circulate water to both engines. The raw-water pumps are located in the basement and piped to the heat exchangers and cooling tower. These pumps are cross-connected in the piping to permit the use of either set interchangeably. Two Gardner-Denver air compressors were installed in the basement. One is direct-connected to an electric motor and is controlled by a pressure switch. The other is connected to a gasoline engine and is controlled by a centrifugal governor.

Three air-receiving tanks, each 30 inches by 72 inches in dimension and designed for a working pressure of 250 pounds, were piped to the compressor and engines. A Gould Hydroil oil purifier for cleaning the fuel oil, and a Hilco lubricating oil filter and supply tank were installed in the basement.

Since the City water supply contained undesirable chemicals in solution, a rain-water storage tank was constructed beneath the office floor and piped to carry the drainage from the roof. A standard type Zeolite water softener was installed, as a standby, and connected to the City mains.

Besides the auxiliaries already named, two OCH American Air Filters were installed on the engines. An 18-point Alnor Pyrometer, all thermometers, and other control equipment were furnished by the Illinois Testing Labs.

One 15,000-gallon fuel oil storage tank was set on concrete foundations, a reasonable distance from the power building. Two day-tanks with one fuel transfer pump for each engine, were installed just outside and gauges for determining the quantity of oil in the tanks were mounted on the inside of the building.

The switchboard was manufactured by Westinghouse Electric & Manufacturing Company. It is the cubicle, totally-enclosed type with dead-front panels. It consists of ten panels, two of which are completely equipped as generator panels, two for feeder panels for the City electric distribution system, one panel controls the white way and residential street lighting circuits, and another is equipped complete for the control of the Octane Transmission Line. One panel is wired and furnished with all instruments and switches to control the central station motors. Three blank panels are installed in the switchboard; one to be used for a future generator, one for a Distribution panel, and one to accommodate a totalizing watt meter.

The generators, pumps, and motors are of Fairbanks, Morse & Company manufacture.

The popularity of the new municipal electric plant in Baird was clearly demonstrated when the first month's operation revealed that sufficient current had been sold to pay all operating expenses and leave a surplus. During this period, consumers were being connected throughout the entire month as rapidly as possible, and the plant had to begin operation from a dead start.

With two months of full operation behind them, the City has a majority of all consumers and more than one-half of the electric load in the City.

The Octane Refinery, with its contribution of $1,000.00, or more, monthly for current, will provide a splendid back-log for the plant operation. This load will be taken on about January 1, 1941.

Albert C. Moore & Company, Consulting Engineers of San Antonio, Texas, furnished all plans, specifications, and estimates on this Plant, and had supervisory charge of the construction work. Mr. W. W. McVey, of the same Company, was Resident Engineer. The Public Works Administration was represented on the Project during the greater part of the time by Mr. W. A. Burton. At the beginning of the job, Mr. C. F. Ende was Engineer Inspector.

EMERGENCY DIESEL ELECTRIC PLANT TO PROTECT THE PUBLIC

WITH the foresight expected of insurance executives, the Bankers Life Company, one of the ranking life insurance organizations in the country, installed a Fairbanks-Morse 6-cylinder, Model 36, 60 hp. Diesel Electric Generator Set in their new two million dollar "Building of the Decade" just opened in downtown Des Moines, Iowa.

This building is currently attracting a great deal of attention. Its many innovations include steel paneled interior walls with factory-enameled finish; an air conditioning system complemented by wall heating and cooling system; a new system of coffer lighting that produces better than 30 foot candles on all working surfaces; an electrostatic precipitator for removing dust from the air; and pillarless interior construction which provides rooms 235 feet long and from 50 to 90 feet wide entirely free of columns, radiators and permanent partitions.

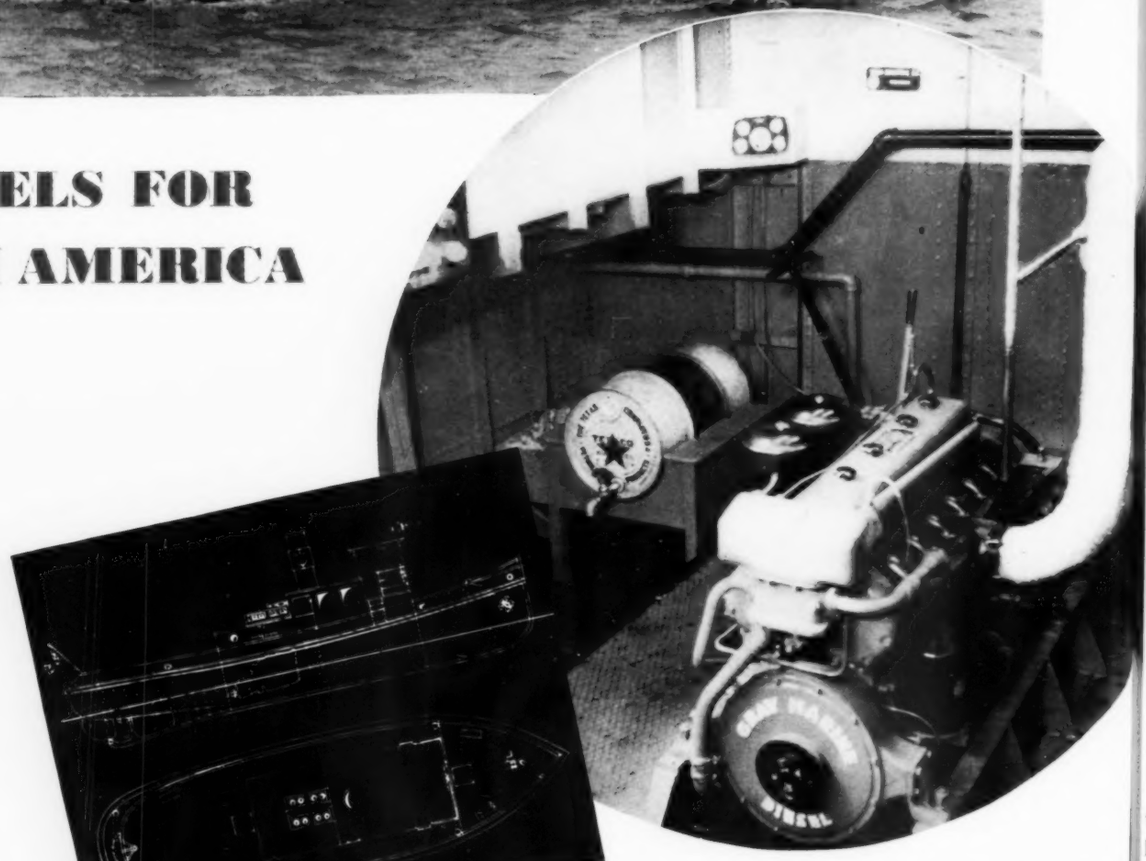
The Fairbanks-Morse Diesel Electric Generating Set is installed in a special room on the eighth floor of the building in a completely "quietized" room and the equipment itself is installed on vibration dampeners to eliminate shock. If an emergency ever arises in which the regular current supply is cut off, this generator automatically goes into action. It supplies current for emergency lights in the 1,100 seat auditorium, stairwells, elevators and at all exits. When the circuits in the building are broken or fail for any reason, this unit trips in starting up, comes up to speed and when the voltage has reached maximum the switch again trips the unit on to the line. When this condition occurs, the unit will continue in operation until such time as the outside circuit is restored, and at that time it will then trip the engine switch off. After this is done, the engine shuts down.

Louvres in the exterior wall open automatically when the Diesel engine starts so that fresh air is provided and gases are removed.

The main purpose of the entire installation is to provide the public with absolute safety and the generator provides this life insurance company with insurance that the building can always be emptied quickly and without danger to the public.

This two million dollar structure houses the offices of the Bankers Life Company of Des Moines, Ia., and includes a 1,100 seat auditorium. The F-M emergency Diesel electric generating set, shown right, was installed to protect the public in the event of current failure.

DIESELS FOR SOUTH AMERICA



Top, the "Unial," a steel tug recently repowered with Diesel. Above: The engine room of the "Unial." Left: Outboard profile and deck plan of the "Unial", showing position of the Diesel.

THE Gray Marine Motor Company reports a rapid increase in the number of Gray Marine 2-cycle Diesels shipped to South America, since the start of the war in Europe cut off Continental sources.

A recent installation of interest to the work boat trade is a six-cylinder 165 hp. Gray Marine Diesel, with fresh-water cooling system, in the UNIAL NO. 2, a 54′ steel tug which operates on the Rio Magdalena in Colombia. The Diesel is equipped with a 4.4:1 reduction gear, providing a propeller speed of 400 rpm, at 1750 engine revolutions. The wheel is a 54″ x 32″ Federal Mogul, three blade propeller. The tug shows a speed of 10 mph. running light, and it tows a barge with 250 ton payload 6.2 mph. at 1500 engine rpm.

The new 2-cycle Diesel replaces a massive 100 hp. compound steam engine. Weight of the former power plant with boiler and water was fifteen tons. The Diesel has afforded an increase in power and speed, and has reduced operating costs. Reason for the replacement is given by the operator as follows: Operating the steam engine using the dirty water of the Rio Magdalena resulted in high upkeep expense on the boiler; the Rio Magdalena has strong currents all year long, and the steam engine did not have sufficient power; the steam engine took up too much space, and its weight gave the boat too much draft; the steam engine was expensive to operate, and required a larger crew.

The operators of the boat express themselves as being highly pleased with the easy operation and excellent work done by the new motor and gear. The fresh water cooling system, which is standard on the engine affords complete protection from the muddy water of the river.

THE MEN BEHIND THE DIESELS YOU BUY

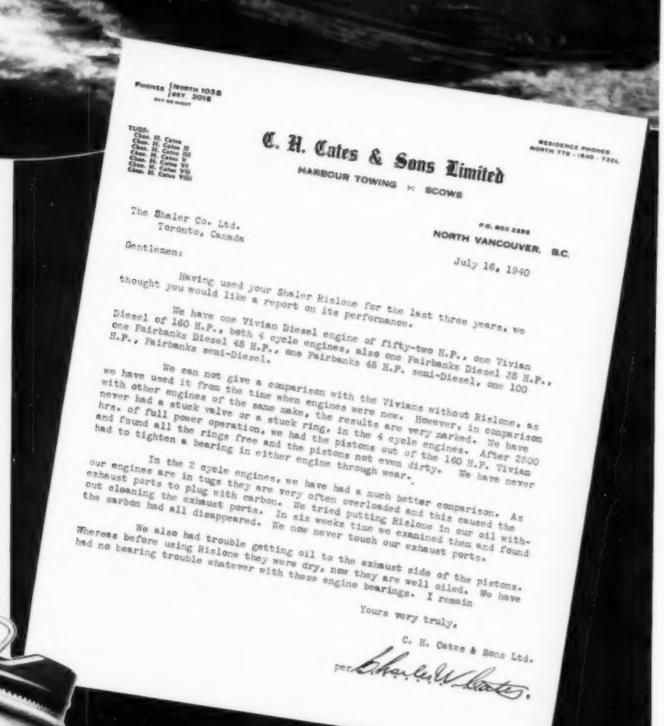
CHARLES BALOUGH

President, Hercules Motors Corporation

★ Charles Balough, President of Hercules Motors Corporation, has devoted practically a lifetime to one industry. As a young man, he graduated from the Royal Institute of Technology in Budapest and first became identified with the automotive industry by becoming a member of the organization of The Northern Automobile Company of Detroit in 1904 where he was associated with the late Mr. Charles B. King. In 1905, Mr. Balough joined the Ford organization and was personal draftsman for Mr. Henry Ford during the inception, development, and production of the famous early model Ford automobiles. Leaving the Ford employ in 1908 he went to work for the Reliance Motor Truck Company of Owosso, Michigan, the first motor truck factory to be taken over by General Motors Corporation. In 1909, Mr. Balough was appointed chief engineer of the Kelly-Springfield Motor Truck Company, Springfield, Ohio, a position he held until late in 1915. At that time, with the support of Mr. H. H. Timken and Mr. Gordon M. Mather he organized Hercules Motors Corporation, Canton, Ohio, to build heavy duty internal combustion engines for commercial vehicles, buses, tractors, agricultural, oil field, marine and general industrial applications. Mr. Balough is a member of A.S.M.E. and S.A.E. During World War No. 1, Mr. Balough was one of a half dozen well-known automotive engineers invited to Washington at the request of the Quartermaster Department to design the Liberty Truck engine. A "personality photograph" of Mr. Balough reveals many interesting highlights. Endowed with a strong sense of humor, a keen student of world affairs, Mr. Balough's presence at any group is assurance of an interesting and informative discussion on almost any subject. His opinions are well-considered. His suggestions are constructive. Tolerance and understanding and complete cooperation in any worthwhile endeavor are characteristic of the man. His outstanding hobby is work. Not merely for the sake of duty, but rather for the sheer love of being efficiently on the job, Mr. Balough's business life is a full and active one. It might truthfully be said that hard work is his chief relaxation! He does find time, however, for reading, for travel, for the theatre, and to be occasionally an enthusiastic spectator at prize fights or football games and many other types of athletic contests in which he has always maintained a keen interest. Quiet, unassuming, and rich in the friendship of men in all walks of life, he has contributed much to the industry he serves.

"Never a Stuck Valve or Stuck Ring"

RISLONE is available in one, and one-half quart cans, and 5, 15, 30 and 50 gallon drums. Use it with regular lubricating oil. The only product of its kind having Diesel engine builders approval.



C. H. Cates & Sons Limited
HARBOUR TOWING & SCOWS
NORTH VANCOUVER, B.C.

The Shaler Co. Ltd.
Toronto, Canada

July 16, 1940

Gentlemen:

Having used your Shaler Rislone for the last three years, we thought you would like a report on its performance.

We have one Vivian Diesel engine of fifty-two H.P., one Vivian Diesel of 160 H.P., both 4 cycle engines, also one Fairbanks Diesel 25 H.P., one Fairbanks Diesel 45 H.P., one Fairbanks 48 H.P. semi-Diesel, one 100 H.P., Fairbanks semi-Diesel.

We can not give a comparison with the Vivians without Rislone, as we have used it from the time when engines were new. However, in comparison with other engines of the same make, the results are very marked. We have never had a stuck valve or a stuck ring, in the 4 cycle engines. We have hrs. of full power operation, we had the pistons out of the 160 H.P. Vivian and found all the rings free and the pistons not even dirty. We have never had to tighten a bearing in either engine through wear.

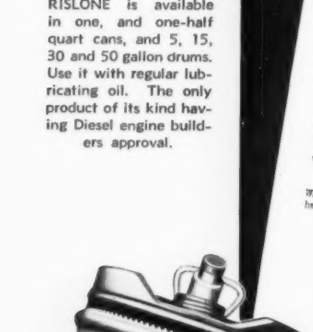
In the 2 cycle engines, we have had a much better comparison. As our engines are in tugs they are very often overloaded and this caused the exhaust ports to plug with carbon. We tried putting Rislone in our oil without cleaning the exhaust ports. In six weeks time we examined them and found the carbon had all disappeared. We now never touch our exhaust ports.

We also had trouble getting oil to the exhaust side of the pistons. Whereas before using Rislone they were dry, now they are well oiled. We have had no bearing trouble whatever with these engine bearings. I remain

Yours very truly,

C. H. Cates & Sons Ltd.

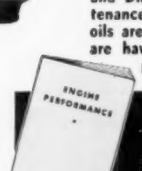
per



C. H. Cates & Sons Ltd., one of the outstanding companies engaged in the towing business in Northwest Vancouver states that RISLONE has cured their problem of stuck rings and valves in their Diesel engines. Read their letter reproduced above.

Rislone, a combination of little known chemicals acts as a solvent to dissolve all types of gums that form in ring grooves and on valve stems. RISLONE'S high capillary attraction assures adequate lubrication to all moving parts, facilitates easy starting and by dissolving the gums which come from all oils and Diesel fuels, permits longer runs before overhauls. RISLONE lowers maintenance costs,—use it with your regular lubricating oil. . . Where special Diesel oils are used, RISLONE will further reduce gum and carbon formations. If you are having ring or valve trouble — let RISLONE rid your engines of these problems. THE SHALER CO., Waupun, Wis.

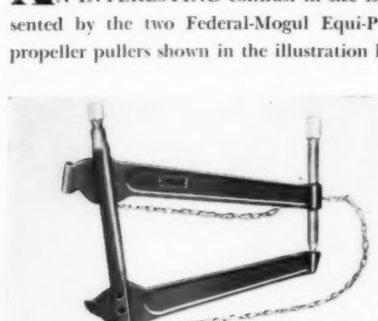
FREE
Write for NEW Booklet
"ENGINE PERFORMANCE"



RISLONE

FEDERAL MOGUL PROPELLER PULLERS

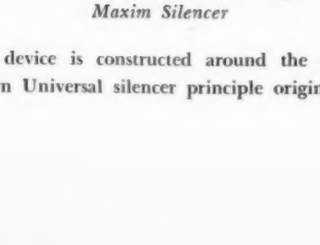
AN INTERESTING contrast in size is p sented by the two Federal-Mogul Equi-Pull propeller pullers shown in the illustration he



with. On the bottom is the Size A, widely use in boat yards and service docks, handlin wheels from 10 to 28 inches. On the top is th new Size B, introduced at the New York Boa Show, which handles wheels up to 70 to 8 inches, depending upon hub length and bor Equi-Puller makes it possible to remove wheel safely and quickly, without damage to th wheel, the shaft or the bearings, because i eliminates pounding and "sledge - hammer" methods of removal. The safety chain prevent the puller from flying off should the wheel loosen suddenly.

THE Maxim Silencer Company announces the development of a combination waste heat boiler and silencer to provide efficient silencing and at the same time collect and use the waste heat normally lost in exhaust.

The design of this new line of waste heat boilers and water heaters is novel since no tubes whatever are used in its construction. Heat is recovered by a simple arrangement of Angle irons which form a very efficient extended heating surface.



Maxim Silencer

The device is constructed around the well-known Universal silencer principle originated

by the company several years ago and therefore no additional silencing unit need be used. The boiler is also combined with an efficient spark arrestor when required, and occupies little more space than the usual muffler. Particular attention has been given the design to permit of its being operated dry over long periods without injury.

A small boiler is being exhibited at the National Motor Boat Show, where it may be seen at the company's booth in Space 41.

Write direct to Maxim Silencer Company, Hartford, Conn. for Data Sheet D201.

AVAILABLE, IF NEEDED

JOHN H. Wells, Inc., announces the design of a new 80 ft. express cruiser for the well known sportsman, David Gerli. Closely following Naval requirements for vessels of her size and type, this new yacht will be readily and quickly adaptable to government service in time of emergency, which is the owner's main purpose in building a new boat at this time.

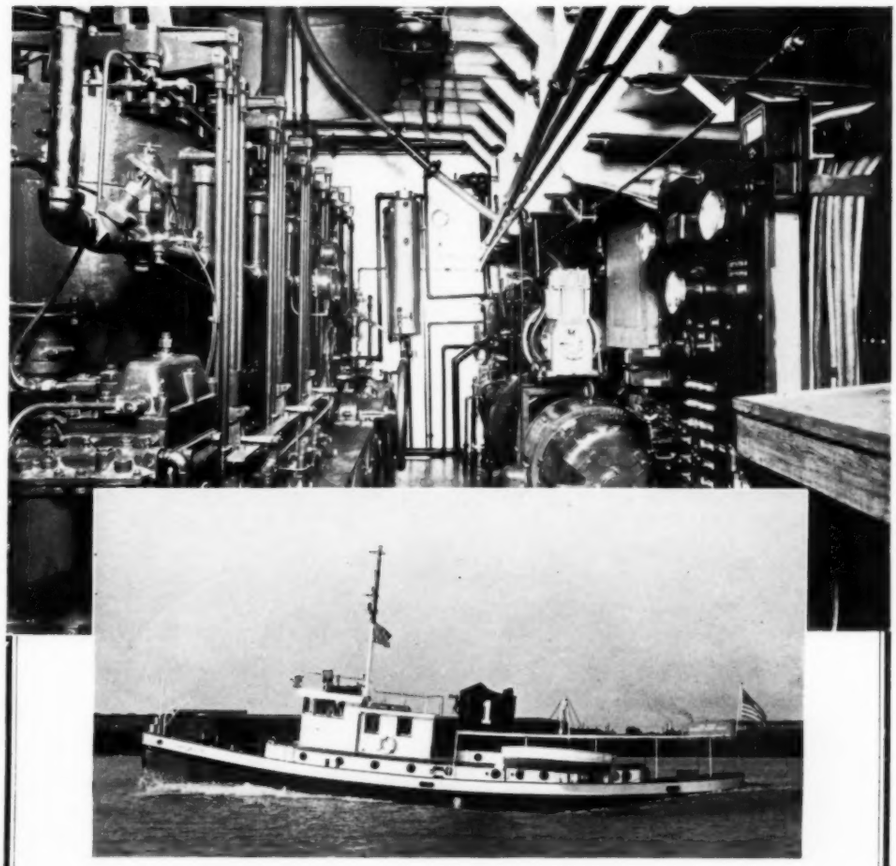
The designers have found it possible to arrange unusual accommodations for the owner, without sacrificing either speed, strength, or seagoing qualities, and feel confident that the new craft will be a notable addition to the growing fleet of Naval Reserve vessels.

ORDERS totalling $6,604,878 have been placed by the Navy Department to furnish propelling machinery for mine sweepers, together with Diesel engines for power boats. The American Locomotive Company, Auburn, New York, was given a contract for nine sets of propelling machinery for mine sweepers amounting to $5,299,890. The Buda Company received an order totalling $1,304,988 to furnish Diesel engines for power boats.

WRITE FOR YOUR COPY

A BULLETIN which fully describes the new 3200 Class Isochronous Pickering Governor is now available. Beautifully illustrated, this booklet includes a line drawing section of the governor which identifies and explains the function of all the essential working parts. The text completely, but concisely covers the construction and specifications of the three 3200 Class Governors, Models K, L, and M.

Readers of DIESEL PROGRESS who desire a copy of this interesting bulletin may secure it by writing direct to Mr. I. M. Crafts, Pickering Governor Company, Portland, Connecticut.



"Oldest Pilot Boat"

Repowered with an Atlas Imperial Diesel, Alnor Pyrometer equipped

The "Jennie Wilson," operating out of New Orleans, enjoys the reputation of being the oldest pilot boat now in active service in this country.

Built in 1879 with steam propulsion, it has been twice repowered. In 1940, an Atlas Imperial 400 H.P., 6 cylinder Diesel with a 2 cylinder 35 H.P. Atlas auxiliary was installed.

The engines were furnished through Arthur Duvic's Sons, distributor for Atlas Imperial Diesel Engine Co. in New Orleans, while the installation was made by the Canulette Shipbuilding Co. of Slidell, Louisiana. As is customary, these Atlas Diesels are equipped with an Alnor Pyrometer to assure maximum engine economy and performance. For the "Jennie Wilson" an Alnor Model RB was used. This is shown at upper right of the engine room view above.

Alnor Pyrometers have enjoyed increasing popularity and now serve many of the world's Diesels, as well as a majority of the nation's pyrometer equipped engines.

Buy or Specify "Alnor"

Write for Catalog

Illinois Testing Laboratories Inc.

423 NORTH LaSALLE STREET, CHICAGO, ILLINOIS

MANUFACTURERS OF "ALNOR" AND PRICE INSTRUMENTS

PRODUCTS OF 40 YEARS' EXPERIENCE

DIESEL RAIL TRANSPORTATION

. . . . *Continued from page 25* . . . .

consist of four 1,000 hp. two-cycle, 12 cylinder, V-type engines, having an 8½" bore and 10" stroke. The starting speed is 75 to 100 rpm., idling speed 280 rpm. and the rated speed 800 rpm. The ready-to-run weight of locomotive is 626,000 lbs. or 156.5 lb. per hp. Weight of one 12 cyl. engine is 25,000 lbs. or 25 lb. per hp. The center of gravity of locomotive is 62" above top of rail.

The fuel oil consumption of the 3,000 hp. Denver Zephyrs pulling 10 light-weight stainless steel cars has averaged about 1.82 gals. per train mile or .55 miles per gal. Therefore, the total fuel consumption for the 2073 miles round trip between Chicago and Denver is 3771 gals. which, at 4½ cents per gal., costs $169.69 or 8.2 cents per train mile. The total fuel consumption on these trains for the year around average is distributed as follows:

Auxiliary power for air conditioning, lighting, etc.	3.97%
Heating boilers	13.70%
Main power plants	82.33%

The cost of fuel and water for a steam locomotive handling a conventional train over this same route amounts to 20.2 cents per train mile. • • •

In bringing the subject of streamliners to conclusion, may I say that never before in the history of railway transportation has finer equipment been attainable than now. Such gratifying developments are due to the concentrated efforts of scientific research, creative ability of the manufacturer, together with a progressive railway management which had the prudent wisdom to visualize just what the traveling public demanded for a return to the rails.

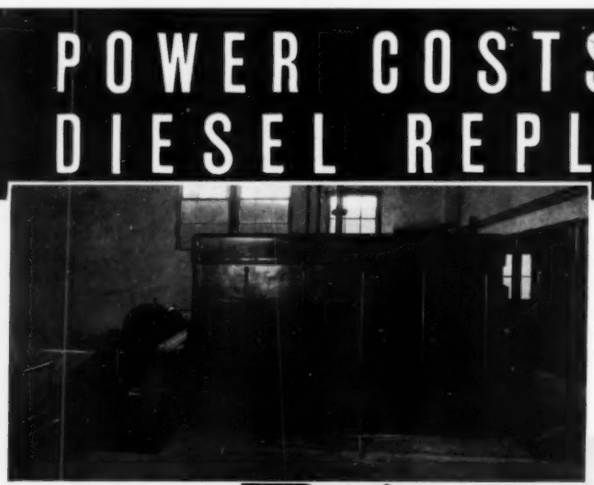
The Diesel-electric has also made great progress in the switching service of American railroads, a service far less pretentious than that offered by the ultra Streamliners, but nevertheless a service where the Diesel is able to show the greatest return on its investment. On the Burlington today we have 25 Diesel-Electric switchers in service, ranging in power from 450 hp. to 1,000 hp., totaling 25,950 hp. A greater saving in operation is derived when a complete yard is Dieselized such as at Western Avenue, Chicago, where seven Diesels were put in service. Recently, nine units were assigned to the Greater Omaha district. This allows for a greater number of steam switcher retirements. • • •

Within the last year a 5,400 hp. Diesel-electric locomotive designed for freight service was placed on test on various roads interested in its possibilities. This is indeed a bold challenge in a field where the steam locomotive is still in its most favored position. The top speed is comparable with the modern steam freight locomotive but the characteristics peculiar to the Diesel-Electric permits a higher average speed with the same maximum speed. • • •

After an important development has passed the embryonic stage and finally presents its usefulness to a waiting world, it must prove its practicability as being something better, something that can perform a duty in a more efficient and economical way than its predecessor. Unless it can prove this, it will automatically perish.

Economy, efficiency and practicability are the judges, regardless of what we say here. These fundamentals create the demand that eventually will bring a new development out of the dark and place it in a position where it will demand respect. • • •

POWER COSTS REDUCED *when* DIESEL REPLACED STEAM...



This 375 hp. Buckeye Diesel Engine replaced steam power in the Amendt Milling Company, Monroe, Michigan, in 1938. Based on two years operating records the Diesel has reduced power costs 61%.

Only Buckeye Diesels have all these features:

1. **Silent Watchman.**
2. **Full pressure lubrication system.**
3. **Cylinder liners.**
4. **Exhaust and intake manifolds not bolted to cylinder heads.**
5. **Reversible shell-type silver alloy bearings.**
6. **Individual fuel pumps for each cylinder.**
7. **Completely enclosed.**
8. **Sizes up to 675 hp. in single units.**

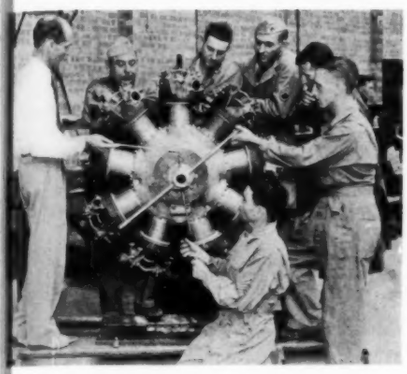
Builders of Stationary and Marine Diesels since 1908

Be Profitwise and Dieselize with Buckeyes

THE BUCKEYE MACHINE COMPANY ..... LIMA, OHIO

BUDA GETS ARMY CONTRACT

ROCK Island Arsenal has recently awarded a new contract to the Guiberson Diesel Engine Company and the Buda Company for light tank radial Diesel engines in the amount of $3,888,705.73. Under an exclusive manufactur-



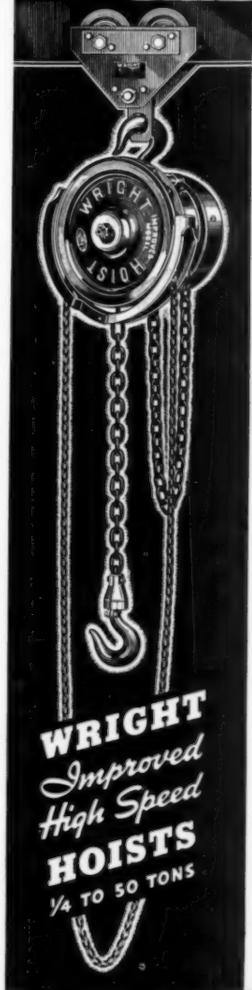
A group of Army men studying the Guiberson Radial Diesel engine, which is manufactured by the Buda Company. These men are being sent in groups from the various Tank Engine Corps to the Buda Company to become familiar with this engine.

ing agreement with Guiberson, the engines will be built by the Buda Company, Harvey, Illinois, in its newly completed $600,000 plant addition.

Mr. J. S. Dempesy, President of the Buda Company, stated that the new plan addition is now almost fully equipped with new machine tools. He expects that by January 1, 1941, these radial Diesel tank engines will be produced at the rate of eight a day. Mr. Dempesy further

Mr. J. S. Dempesy inspecting one of the Buda Diesel Industrial engines.

states that with the new plant to handle the manufacture of radial engines, Buda's regular manufacturing facilities will enable them to maintain normal production on their regular line of Diesel, Gasoline, Natural Gas and Butane Engines.



WRIGHT
Improved
High Speed
HOISTS
¼ TO 50 TONS

● ***Speed — economy — safety!*** That's the demand of American industry today. And the **Wright Improved High-Speed Hoist** is one of the answers to that demand.

In the first place, the inclusion of the words "High Speed" in the WRIGHT HOIST name is a statement of fact. They mean what they say. The WRIGHT HOIST *is fast*, smooth and positive in action—because of its load wheel and driving spindle bearings.

Wright's economy comes through its rugged and precision design—its year-in and year-out durability—its full zinc coating which makes WRIGHT HOISTS immune to corrosion.

And safety is inbuilt. The load chain has a safety factor of 7 to 1 and the special process steel of which it is made permits the chain to elongate (because of overload) 3″ to the foot before breaking. This same visual factor of safety is inherent in the bottom hook because this hook will slowly open to indicate overload beyond the elastic limit of the chain.

WRIGHT TROLLEYS are made to give the same fast—economical—safe service as WRIGHT HOISTS. Write for your copy of the new Wright Catalog and learn the 21 points of WRIGHT superiority.

WRIGHT MANUFACTURING DIVISION
YORK, PENNSYLVANIA

ACCO

AMERICAN CHAIN & CABLE COMPANY, Inc.
In Business for Your Safety

A SHIPMENT OF TWIN DISC

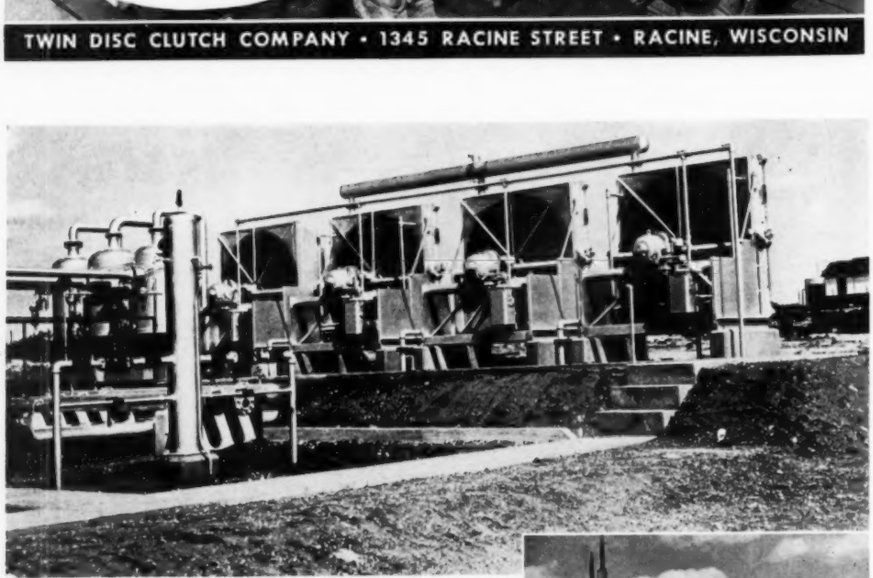
Hydraulic Torque Converters

The outstanding success of Twin Disc Hydraulic Torque Converters in railcar installations leads the way to a practical and economical application of a light-weight engine supplying power directly to the axle.

The Twin Disc Hydraulic Torque Converter multiplies the engine's torque, thus making available the required starting characteristics. By eliminating jars and jerks, it assures a smooth, easy, rapid acceleration from a standing start . . . then a quick, easy shift into direct drive for top speed.

For complete description, ask for Bulletin No. 119A.

TWIN DISC CLUTCH COMPANY • 1345 RACINE STREET • RACINE, WISCONSIN



Illustrated is a battery of Young, Master Series, Full Flow, Water & Power Conserver Engine Jacket Water Coolers. This installation is cooling the jacket water and oil in two 400 H.P. Cooper-Bessemer Gas Powered Compressors located at San Benavides, Texas, properties of the Continental Oil Company.

If you have problems in cooling gasoline, gas or Diesel engines, submit them to us—there is no cost or obligation.

Write for descriptive literature

A. R. Flournoy, P. O. Box 191, Bell, California
Happy Belting Co., 310-312 E. Tenth St., Tulsa, Okla.

YOUNG RADIATOR CO., RACINE WIS.

Young Quality

NEW TRADE LITERATURE

"ENGINE Performance," a 64-page stiff-covered book dealing with the care, lubrication, operation and tune-up of Diesel engines has just been published by The Shaler Company of Waupun, Wisconsin, makers of Karbout and Rislone.

The book is replete with illustrations and valuable information, discussion of oils, suggestions on improving engine performance, tune-up procedure, questions and answers,—with a special chapter devoted to the Diesel engine field, in which are enumerated the essential factors for improved performance, a discussion of operating and maintenance problems, sticking rings, sludge or sludge emulsion. This book is offered without cost to all who service, sell, or use Diesel engine equipment of any kind—trucks, buses, tractors, airplanes, construction and road machinery, boats, or stationary machinery. Write for your free copy of "Engine Performance" direct to The Shaler Company, Waupun, Wisconsin.

THE Bureau of Supplies and Accounts of the Navy Department has placed a contract with Henry B. Nevins, Inc., City Island, N. Y. to build motor minesweepers, totalling $1,443,476.08.

MORE ABOUT DIESEL RAIL TRANSPORTATION

TWELVE hundred business and industrial leaders joined with officials of the Santa Fe Railway and the Los Angeles Chamber of Commerce on December 11 at a huge ten million mile civic luncheon to salute the completion of ten million miles of streamlined train travel by the railway's fleet of streamliners now in service.

T. B. Gallaher, of Chicago, Passenger Traffic Manager, welcomed the guests who filled the colorful Biltmore Bowl in Los Angeles. Rudy Vallee acted as Master of Ceremonies during the entertainment program.

Fred G. Gurley, of Chicago, Vice President of the Santa Fe, outlined the remarkable progress made by the railway in developing streamlined train travel in recent years. He pointed out that since May 12, 1936, when the first Super Chief made its initial run from Chicago to Los Angeles, a grand total of 10,423,39[illegible] miles had been rolled up by the company's fleet of sixteen lightweight passenger streamliners. He said that the Santa Fe now operates

59 Diesel units producing 72,300 horsepower. In addition, the railway has on order four road passenger units, eight freight units and three switchers which will bring the total to 74 Diesel units representing 92,800 horsepower.

When the Diesel road freight units are delivered, Santa Fe will be the first railroad in the history of transportation to have Dieselized operation in all branches of rail service. The railway is also the only one in the country which owns and operates a completely equipped "Square roundhouse" for servicing and repairing Diesels. This Diesel shop is located in Chicago.

H. T. MOORE

H. T. MOORE, who is so well known in this industry of ours as an Oil Clarification Engineer, has recently taken up his new duties as Eastern Zone Manager for the Briggs Clarifier Company. Mr. Moore's territory, in the main, will consist of New York, New England, New Jersey, Pennsylvania, and parts of Western Ohio.

It probably is no exaggeration to say that Mr. Moore is one of the oldest Diesel Oil Clarification Engineers in this country in point of service. For many years, he was connected with Sharples, later with Hydroil when it was made at Lebanon, Indiana, and in recent years with the Hydroil Division of Goulds Pumps, Inc. Mr. Moore's headquarters will remain in Philadelphia, where they have been for several years past.

"SALES ENGINEERING"

A NEW book recently published by John Wiley & Sons, Inc., and edited by Bernard Lester of Westinghouse Electric & Manufacturing Company, is so out of the ordinary that we heartily recommend it to our readers' attention.

Mr. Bernard Lester is one of the outstanding experts in this country, not only in sales engineering, but in the training of sales engineers.

In this book, in a very logical way, he outlines the work of the sales engineers with heavy emphasis on the importance of sales engineering in our system of economy. Mr. Lester very clearly places sales engineering in its proper place in the employment field for technical men.

For the man who can develop better ways of distributing goods, there are substantial rewards. No one disputes the fact that our skill to

Users of YM Oil Purifiers have

2 Great Advantages

1. They do not pay fancy prices for common earth marketed under trade names.
2. They can remove fuel dilution and all other contaminants. No other purifier built anywhere can do a better job.

CLEAN OIL — CLEAN ENGINES

★

YOUNGSTOWN MILLER CO., INC.
SANDUSKY, OHIO

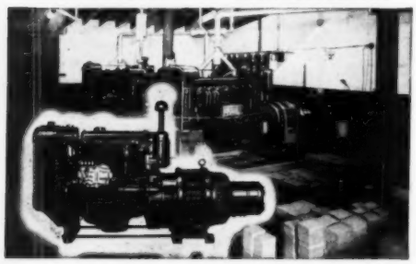
Specify
Quincy
COMPRESSORS
For Dependable Diesel Starting Service
Hundreds of Diesel installations throughout the country have proved the dependability of Quincy Compressors for starting service. Many leading Diesel manufacturers furnish Quincys as standard equipment. Modern design and new operating features assure outstanding over-all efficiency. Construction is simplified. Radiation is 12% greater. Lubrication is more thorough — more positive. There is a Quincy Compressor ideally suited to every Starting Service requiring intermittent pressures up to 500 lbs. per sq. inch. Models available with either gas engine or electric drive or a combination of both. Remember! Specify Quincy for dependable Diesel Starting Service!
Only Quincy Offers All These Features
1. Timken Roller Bearings. 2. Semi-Steel Pistons. 3. Perfectly Balanced Crankshaft. 4. Cushioned Steel Valves. 5. Lynite Rods. 6. Constant Level Oiling. 7. Improved Cooling. 8. Nickel Chrome Castings.
QUINCY COMPRESSOR CO., 411 Main St., Quincy, Ill.
Branch Offices: New York • Chicago • San Francisco
GET NEW FREE BOOK
Contains Complete Information on Quincy Compressors for Diesel Starting Service.

READY-POWER INTERNATIONAL

EIGHT MODELS 12½ TO 50 KW.

DIESEL ELECTRIC PLANTS

ELECTRIC POWER AT LOW COST • FOR ALTERNATING AND DIRECT CURRENT

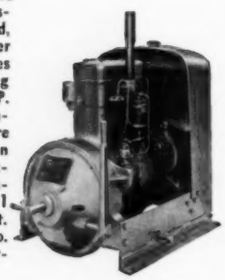


★ If your electric power costs are excessive—or
★ If you need electric power, and power lines are not installed—or
★ If your wired power service is not completely dependable and you need reserve or stand-by capacity, then the installation of
★ READY-POWER • INTERNATIONAL Diesel Electric Power provides the answer to your problems and will undoubtedly save you money. *Write or ask for literature.*

THE READY-POWER COMPANY
3828 GRAND RIVER AVENUE
DETROIT, MICHIGAN, U.S.A.

STOVER TWO CYLINDER LANOVA DIESEL ENGINES ARE NOW READY

Smoother running. More power per cubic displacement and per pound, with proportionate lower cost. Available in 4 sizes and a variety of mounting bases. 7½ and 10 H.P. models are single cylinder. 15 and 20 H.P. are twin cylinder. Illustration shows conventional stationary type. Twin cylinder models have No. 1 Bell housing. Write Dept. D64A for Bulletin No. 51 with complete information.



STOVER MFG. & ENGINE CO., Freeport, Ill.

REPRESENTATION WANTED

For a modern line of heavy Commercial Diesel Engines by an established Massachusetts concern with complete foundry and machine shop facilities for overhauling and servicing. Operates three Diesel Engines as auxiliary to Water Power. Customers include many prospects for heavy type Diesels.

Address reply to Box 125
DIESEL PROGRESS
2 West 45th Street, New York

produce has outdistanced our skill to distribute efficiently. The big problem facing industrial management is not so much one of design or fabrication or construction of goods, but effective and economical distribution. This is the field open to sales engineers—men who are selling equipment and services which require engineering skill in their selection, application, and use.

Each year a large number of technically trained men enter the field of sales engineering. These men should buy Mr. Lester's new book, because it offers in simple terms the principles of sales engineering, indicates the importance of the work, and suggests the opportunities in present-day society. Copies of "Sales Engineering" can be obtained from DIESEL PROGRESS, 2 West 45th Street, N. Y., by remitting $2.00.

CATERPILLAR APPOINTMENTS

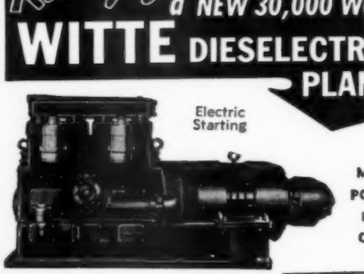
CATERPILLAR Tractor Co. has announced two important advancements in the company's organization.

Donald A. Robison has been made a vice-president of the company with administrative direction of all selling and advertising activities. The office of general sales manager, which Mr. Robison leaves to assume his higher duties and responsibilities, is being filled by the advancement of Gail E. Spain.

D. A. Robison

Mr. Robison, a native of Nevada, has been closely associated with Caterpillar Tractor Co. activities for many years. He was graduated from the University of Nevada with a business degree, and almost immediately went to work for the company. Since 1926, he has advanced rapidly through the various activities in the credit and treasury department to the office of

Ready for You a NEW 30,000 Watt
WITTE DIESELECTRIC PLANT



Here's the new, larger, WITTE Dieselectric—ready to meet your demands for extra power and save you money every hour you operate! Sets a new high standard for efficient, low cost dependability. Gives you *all* the famous WITTE engineering features.

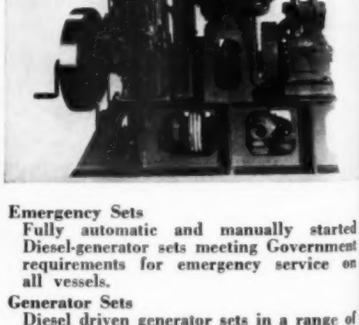
POWER & LIGHT for Only 1¢ a Kilowatt

Make your own electricity amazingly low cost. WITTE Diesels operate on cheap, non-explosive fuel. Assure constant low cost operation without constant supervision. Pay only for power used. Always ready!

A WITTE for Every Need
—2500 to 30000 watts, 4 to 40 H.P., vertical or horizontal; 1, 2 and 4 cylinders. Manual, electric or full automatic control. Rugged, compact. Backed by 70 years of reliability. Soon *pay for themselves* out of savings in power costs. *WRITE* now for illustrated literature and WITTE Finance Plan.

WITTE ENGINE WORKS
2441 Oakland Ave., Kansas City, Missouri

WOODWARD GOVERNOR CO.
WORLD'S LARGEST AND EXCLUSIVE MANUFACTURERS OF HYDRAULIC GOVERNORS FOR PRIME MOVERS
ROCKFORD • ILLINOIS



Emergency Sets
Fully automatic and manually started Diesel-generator sets meeting Government requirements for emergency service on all vessels.

Generator Sets
Diesel driven generator sets in a range of sizes to fulfill the auxiliary power requirements on all motorvessels.

Auxiliary Sets
Various combinations of Diesel engine, with generator, compressor, pumps and power take-off to fit the individual requirements of all classes of motorvessels.

JOHN REINER & CO., Inc.
Long Island City, N. Y.
Reiner Diesel Auxiliary Units

assistant treasurer, treasurer, and then general sales manager.

Mr. Spain, who came from Portland, Oregon, and received the degree of Mechanical Engineer at Oregon State College, is widely known throughout the construction and agricultural equipment industries. In 1920, he went to work for the Willamette Iron & Steel Works at Portland, and during his nine years with that concern advanced through the engineering and sales departments. For two years before coming to Caterpillar, Mr. Spain was Willamette's Sales Manager.

G. E. Spain

In 1929, he joined the Caterpillar organization at San Leandro, California, being transferred to Peoria, Illinois, in the summer of that same year. First a logging representative for the company, Mr. Spain later held positions in the Merchandise, Engine Sales, and General Sales departments. Since 1938, he has been Manager of the Sales Development Division.

SUN Shipbuilding & Dry Dock Company of Chester, Pa., is now negotiating with the Navy Department for orders totalling $69,000,000 for the construction of destroyers, tankers, and merchant ships. These contracts are expected to be completed within a short time.

BULLETIN ON FUEL OIL TANK SOLVENT

PETROLEUM Solvents Corporation has issued a bulletin describing the effective use of Siloo tank solvent in cleaning up dirty fuel oil tanks and in maintaining fuel oil in storage in a clean condition. Write direct to Petroleum Solvents Corporation, 331 Madison Avenue, New York, N. Y., for your copy of this interesting bulletin.

Lower Your Cost of Filter Maintenance with Re-Packable Element Type

MICHIANA FILTERS

MICHIANA PRODUCTS CORP., Michigan City, Indiana

LOW bidder on the contract for the construction of two Coast Guard cutters of the Cactus type was the Marine Iron & Shipbuilding Company, Duluth, Minn. This yard also bid on a 200 ft. cutter.

NEW ENTERPRISE MACHINE SHOP

WORK has already started on a new machine shop for the San Francisco plant of Enterprise Engine and Foundry Company, it was announced by Captain C. S. McDowell, president.

Destined to be one of the largest in San Francisco, the new shop will cover 19,500 square feet and will be all-steel construction. Containing two 15-ton cranes, the shop will triple the capacity of Enterprise's present machine shop. It will be located on 18th Street between Florida and Alabama Streets. Construction work is being done by the Judson-Pacific Co.

In commenting on the new addition, Captain McDowell stated, "Our new shop will not only enable us to take care of our current stepped-up production requirements, but also gives us sufficient extra capacity for further increases in production which are indicated for the very near future."

U.S. COAST Guard Headquarters, Washington, D. C., will open bids for the construction of a 65′ Coast Guard Cutter on January 7. This cutter will measure 65′ x 14.5′ x 6.3′ with a load displacement of 33.5 tons. It will have a steel hull and a speed of 15 miles per hour.

NEW LINE OF SMALL DIESEL ENGINES

THE Stover Manufacturing & Engine Company now has ready for delivery a new line of Diesel engines, equipped with the Lanova combustion chamber that develop more power per cubic displacement and per pound, and that can be sold at proportionately lower cost.

These new Stover Diesels are smoother running and more economical to operate. They now are available in four sizes and with a variety of mountings. The 7½ hp. and 10 hp. models are

MAXIM

SILENCERS

COVER THE FIELD

STEAM EXHAUST

This installation shows a Maxim Silencer on the exhaust of a Corliss Steam Engine. Maxims also provide effective silencing for high pressure steam discharge, boiler blow-off, etc.

COMPRESSOR INTAKE

This Maxim Intake Silencer solved a serious problem of air borne vibration . . . cut pulsation and silenced the intake so that even those working close to it don't notice the operation of the compressor.

ENGINE EXHAUST

These Maxim Exhaust Silencers assure silent operation for the La Junta Light and Power Plant, La Junta, Colorado. Maxims are built for use on the exhaust or intake of all kinds of internal combustion engines.

NEW MAXIM WASTE HEAT BOILER

(See it at the National Motor Boat Show)

This new waste heat boiler combines silencing, the conservation of waste heat from exhaust, and, when desired, an efficient spark arrestor.

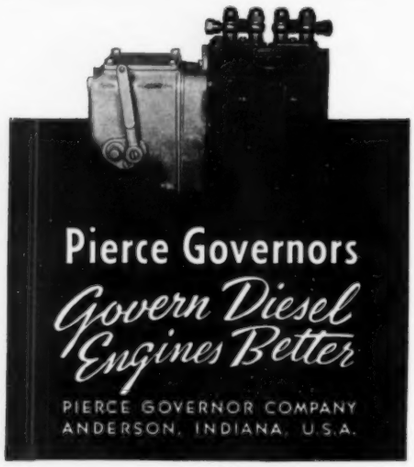
Write for details

The MAXIM SILENCER Co.

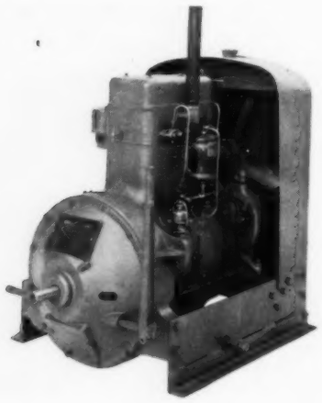
94 Homestead Ave. Hartford, Conn.

MANZEL
FORCE FEED
LUBRICATORS
for MOST
EFFICIENT
DIESEL ENGINE
LUBRICATION
Model "94"
Positively deliver oil to Diesel cylinders and bearings with unfailing regularity. Start, stop, speed up and slow down with engine.
There's no guessing about Manzels. You see the actual amount of oil delivered, in the sight glass, on its way to the cylinder after it has passed through the pumping unit. Sight glasses are easily refilled with Manzel refilling gun, without disconnecting oil lines or removing pumping units from reservoir.
Write for Catalog 94-B.
MANZEL BROTHERS CO.
275-277 Babcock St. Buffalo, N. Y.

PETROMETER
FOR TANK GAUGING EQUIPMENT FOR
DAY TANKS & CLEAN OIL STORAGE
PETROMETER CORPORATION
8 STAR SQUARE LONG ISLAND CITY, N. Y.



single cylinder. The 15 hp. and 20 hp. models are of the twin cylinder type. The illustration shows the conventional stationary type of mounting. The twin cylinder models have No.



1 Bell housing. Stover's Diesel Bulletin No. 51 provides complete information covering this new line of Diesels. Write direct to Stover Manufacturing and Engine Company, Freeport, Illinois, for your copy of Bulletin No. 51.

PUSEY & Jones was awarded a $3,000,000 contract for the construction of two dredges by the War Department. These will be twin-screw, Diesel-electric hopper dredges of the shallow draft type, 216' in length and will be capable of carrying 700 cu. yds. of material without drawing more than 12 feet at 13 knots. The first vessel is scheduled to be delivered in one year and work will be started early next March. The second ship will be ready six months after the first.

NEW CATERPILLAR TRACTOR

A CATALOG, devoted entirely to the new 80-horsepower Diesel D7 tractor, has just been issued by Caterpillar Tractor Co.

Printed in three colors, the booklet points out the new tractor's features by the use of numerous illustrations. Cutaway pictures show cro sections of the engine and the tractor chass while the accompanying text gives a comple description of all working parts.

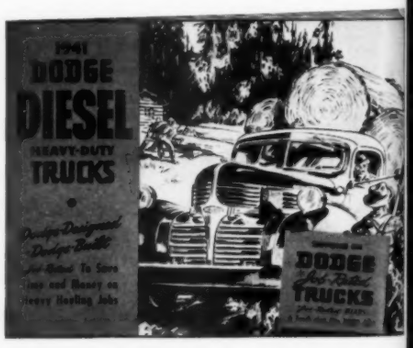
Separate sections of the book are devoted t the fuel system, general engine constructio features, the lubricating system, the transmi sion and final drive, the tracks and the trac roller assemblies, operator comfort, and avai able allied equipment.

Smaller photographs, taken in the company factory, show some of the precision method used in the manufacturing of the machine. A complete tabulation of specifications is also in cluded. Readers of DIESEL PROGRESS who ar interested may secure a copy of the new cata log by writing direct to Caterpillar Tracto Company, Peoria, Ill.

FAIRBANKS, Morse & Company, New York, recently sold a 400 hp. Diesel engine t be installed on the Tugboat *Tompkins* fo Thomas Ahlquist of Arverne, Long Island.

SEND FOR IT

THE 1941 edition of the Dodge Diesel booklet, a thorough-going, copiously illustrated presentation of the Dodge Diesel engine as used



in Heavy Duty Trucks, is now available. Describing, as it does, the construction and operation of the Dodge-engineered and Dodge-built Diesel, also details of Dodge heavy-duty trucks, including both engine and chassis specifications, this book is both interesting and useful to engineers, truck owners and operators, long distance haulers and contractors. You may secure your free copy by writing direct to K. N. Gougeon, Dodge Division, Chrysler Motor Co., 7900 Joseph Campau, Detroit, Michigan.

COLUMBIA A. C. GENERATORS

• Columbia A. C. Generators are quality built and attractively priced for resale by engine builders and dealers.

Sizes: 1 to 300 KVA
Speeds 1800, 1200, 900, 720, 600, 514, 450 R.P.M.
Single or 3 Phase

Furnished with either direct connected or belted exciter. Stock shipment.

COLUMBIA ELECTRIC MFG. CO.
4503 HAMILTON AVENUE • CLEVELAND, OHIO

A. C. Generator with Direct Connected Exciter